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FLIGHT
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AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Monopoly Cubed

THREE monopoly corporations instead of one. That appears to sum up the Government's plan for British Air Transport. Two are to operate, if possible, without subsidies, being given routes which, by taking the rough with the smooth, should enable them to gain on the swings what they lose on the roundabouts. In the case of the third, the Commonwealth and North Atlantic, apparently it is not thought that the "smooths" will suffice to compensate for the "roughs," and B.O.A.C. will continue as the monopoly subsidy company. So that we shall have one company which has a monopoly of both operation and subsidies, and two companies which have monopolies of operation. That is a rather grim thought, but it appears to represent the facts.

We know, of course, that we shall be told that these monopolies relate to agreed scheduled routes which will form the nucleus of the network, and that others which may be established later may be awarded to subsidiaries of the "Big Three" or even to "outsiders"; but does anyone seriously believe that any outsider is likely to be able to compete for a route with such a triumvirate? The few independent operators who have managed to retain their independence (most of them were absorbed some time ago) are not even to be paid anything for their goodwill. True, the White Paper does state that "the new air transport Corporations will be entitled to acquire at a fair valuation from existing airline operators any physical assets which are needed for the new services." But what is likely to be the value of such physical assets?

Only one of the independent operators, Allied Airways, has continued to operate during the war. The aircraft are obsolete, and even a *very* fair valuation is not likely to rate them very high. Other companies which have not been able to operate during the war did good work in different parts of the country. It could certainly not be argued that they were all small beer without sufficient capital to ensure efficient operation. Scottish Airways, for instance, had and has ample backing. And Whitney Straight, for example, has great resources. Quite frankly, we cannot see that people such as these, and others who could be mentioned, are to receive a fair deal. When the independent bus operators were absorbed by London Transport, they were at least given some compensation. The offer that independent operators may be allowed to take up shares either in a main corporation or in a subsidiary is not likely to be snapped up.

One aspect which impresses us as being somewhat dangerous is that under the new scheme there is likely to be what will almost amount to a technical dictatorship. The railways have some experience, the shipping companies none, so that it is logical to assume that both will, in varying degree, obtain their technical advice from B.O.A.C. Not that we doubt the judgment of that corporation, but just now we are, technically, at the beginning of a new period of development, and the B.O.A.C. cannot have, nor, we are sure, would they claim to have, any monopoly of technical acumen. There is truth in the old saying that two heads are better than one.

No Yardstick

IN our issue of March 8th we commented on the need for rivalry—as distinct from cut-throat competition—in order to provide a yardstick with which to measure the efficiency of any particular route. The only provision made for this in the White Paper is a reference to a judicial tribunal to be set up. How such a tribunal is to judge the efficiency of a route is not clear

if there is no parallel route the detailed figures for which are available. A certain degree of obscurity appears to surround the question of licensing. It will be recollected that the Air Transport Licensing Authority was abrogated at the outbreak of war. Just why it was not merely suspended is not known. In the House of Lords debate Lord Swinton said: "In my opinion it would be very convenient if the same tribunal which deals with rates, fares and facilities were also the tribunal dealing with applications to run new routes." Reading between the lines, one forms the impression that this question of licensing is not regarded by the Government as of any great urgency. Perhaps the explanation is that, to quote the White Paper, "It is intended that the agreed schedule of routes to be initially assigned to the three Corporations shall include all those upon which, in the view of His Majesty's Government, it is essential that United Kingdom Air Lines should be ready to operate as soon as war conditions permit and the necessary aircraft are available."

On the question of subsidies, the White Paper explains that the Corporation to which the internal routes will be assigned (the railways, in other words) is willing to operate without subsidy, both the remunerative and the unremunerative routes. That sounds attractive, but it may prove that this is a small price to pay for the privilege of having a monopoly on the internal routes. From the point of view of giving the public maximum service, it might well have been better to have introduced competition on the internal routes, paying for the less remunerative a higher air mail rate to the operators. This is done in America and seems to have worked very well there.

Anxiety was expressed by several speakers in the House of Lords debate concerning the supply of British civil aircraft, and Viscount Swinton admitted to sharing it, at least so far as the immediate future is concerned. That is understandable. What is less obvious is the reason for continued anxiety. The Ministry of Aircraft Production must clearly award the priority and the orders while the war is on. But it is difficult to see why draughtsmen, the chief bottleneck, cannot now be turned on to civil types.

The answer that they are too busy on military types does not appear very logical when one comes to examine it. Any military types on which the draughtsmen are alleged to be so busy cannot possibly be ready in time to be of any great use in the war with Germany. It will be over long before most of these new types could be in operational service in any significant numbers. For those which are already in production the drawings will have been finished. Those which are not yet in production will be too late, anyway. So why not permit the switching-over of the relatively small number of draughtsmen needed to get out our civil types quickly?

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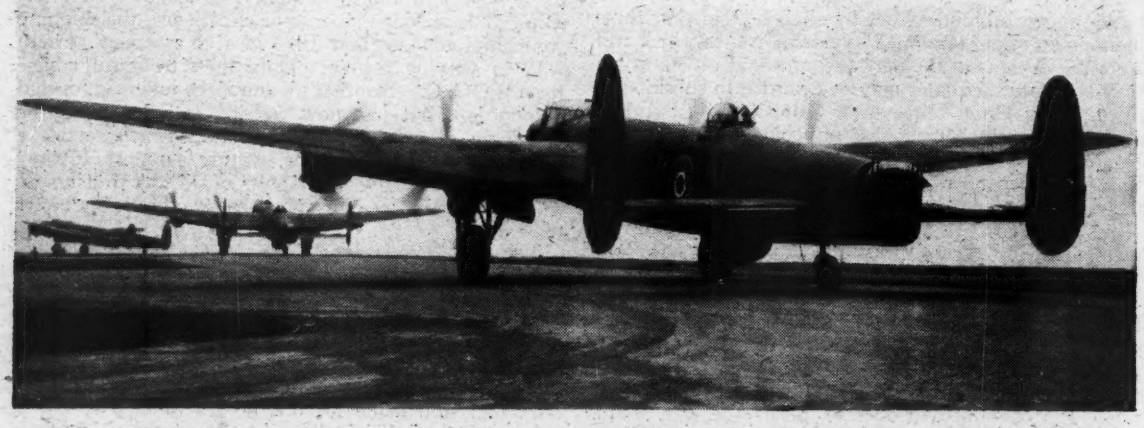
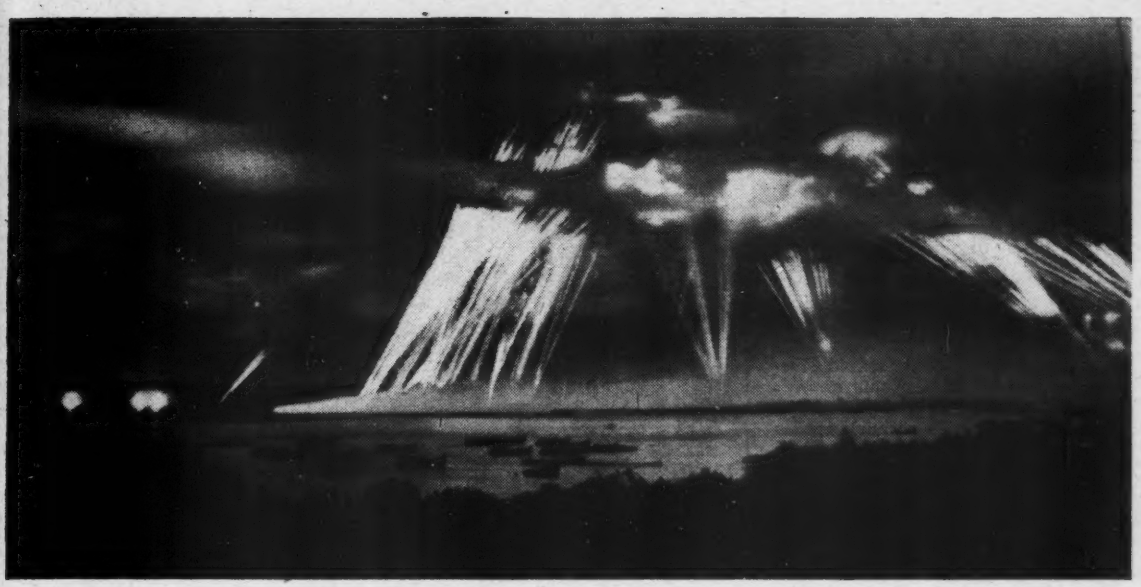
The Other Side

ALTHOUGH we have criticised certain features of the White Paper on British Air Transport, it is only fair to admit that there are good points in the suggested scheme. Doubtless by the time Parliament has expressed its views, some of the less attractive aspects will be modified. In the meantime the White Paper does form a very useful basis upon which to build. On the credit side we have at long last got away from the single "chosen instrument," and, let us hope, from that abominable expression as well. We have a plan, and a plan which promises to enable a start to be made as soon as the war situation permits. We have a Minister for Civil Aviation who will give his great energy to the subject. And we have either already secured or have every hope of securing the very closest co-operation with other countries of the British Commonwealth. The Commonwealth Governments have, as the White Paper points out, expressed their desire that reciprocal services from their countries to the United Kingdom shall be operated in parallel with the United Kingdom services to their countries, and arrangements are being made for reciprocal facilities.



BRITISH AND BEST: The old Victorianism "British and best, feel the weight" is certainly borne out by the heavies of Bomber Command. They have proved to be the best, and Germany can testify to "feeling the weight."



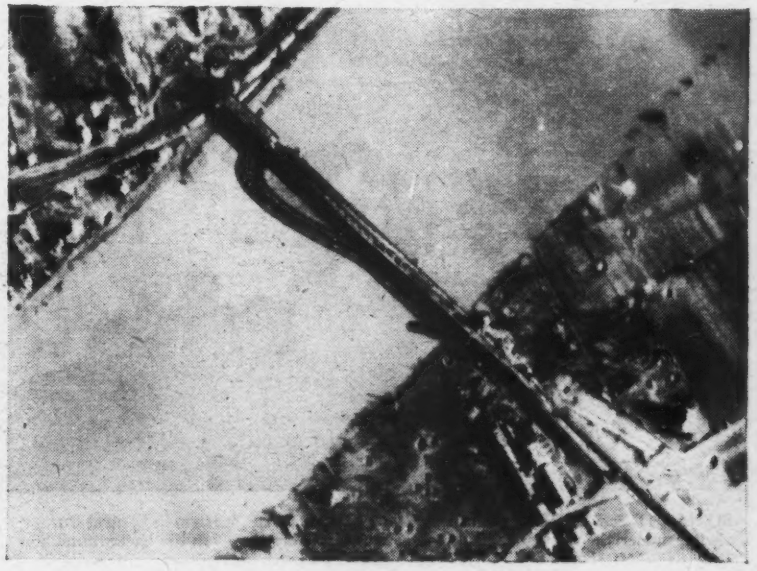
LATE JAPS : Japanese night bombers get a hot reception over Leyte Island. Three bombs are bursting on the left and, in the background, a vessel is laying a smoke-screen over the harbour.

WAR in the AIR

Ten-ton Bombs Dropped : Air Attacks on Remagen Bridge : Bombers Fly Up from Italy

ANY Germans who were in the neighbourhood of (but not too near) the Bielefeld viaduct, which carries the last remaining double-track railway from the Ruhr to the rest of Germany, on the afternoon of March 14th must have had the shock of their lives. On that occasion some Lancasters flew over and dropped bombs. But what bombs! They weighed 22,000 lb.—getting on for double the weight of the 12,000-lb. ones which had previously been the biggest weapon in the R.A.F. armoury. In length the new monsters measure 25ft. 5in., and the diameter is 3ft. 10in. The Lancasters were probably modified to carry them. The mere noise that they would make in falling would be enough to terrify anyone within earshot; and one remembers that the Germans once used whistling bombs because they believed that their noise would spread terror and dismay. If they believed that other people would be affected that way by noise, it is reasonable to assume that the Germans themselves have an antipathy to noisy missiles. But the noise caused by this bomb's descent to earth would be nothing in comparison with the noise of its explosion. And as for the destruction caused. . . .

One Lancaster pilot who dropped one said that as the bomb was released his aircraft shot up 500ft. into the air. When it exploded he felt as if someone had hit him severely in the back. His bomb-aimer said that as he pressed the bomb release he was shot up from the floor, and came down with a bang which knocked all the breath out of his body. The devastation down below must have been terrific. It is worth re-



BY ACCIDENT OR CHANCE? : An R.A.F. reconnaissance photograph of the bridge over the Rhine at Remagen which was captured intact by the American 1st Army.

WAR IN THE AIR

calling that the 4,000-lb. bomb was first used four years ago, the 8,000-pounder in 1943, and the 12,000-pounder in 1944.

The Germans have started a new offensive against the Russians round Lake Balaton, in Hungary. No doubt their object is to hinder, as they are most unlikely to stop, the Russian advance to Bratislava and Vienna. There has also been fighting to the north of Budapest. Bombers from Italy joined in this contest, and Mustangs engaged the German aircraft near the lake, while heavy bombers went for oil refineries within 35 miles of the Russian front. These operations were undertaken by arrangement with the Russian command.

Feeble Luftwaffe Efforts

AT the same time it is worth noticing that 16 Me 190s attacked Thunderbolts near Lake Garda—once famous for the records put up over it by the seaplanes of the Italian high-speed flight. Sixteen is not a very serious number for the Germans to have used against the American fighters, but enemy aircraft are so rarely seen in Italy that every appearance is remarkable.

The fine weather in the early part of March allowed the Air Forces of the Allies to resume their well-understood job of helping the ground forces which fought their way up to the Rhine. We are constantly hearing of new oil plants being bombed, and last week the U.S. 15th Air Force, based in the Mediterranean, but working under the orders of Gen. Spaatz, sent a body of Fortresses to bomb Ruhland, 30 miles north of Dresden, which is described as the largest synthetic oil plant still available to the Germans.

Towards the week-end Gen. Patch's 7th Army launched an attack on the Saar Basin. It was supported by the 1st Tactical Air Force, an American formation. not the old British 1st T.A.F., which fought all through the final Libyan advance, with Air Marshal Coningham as its A.O.C. This 1st T.A.F. which works with the 7th Army contains both American and French formations. Its medium bombers set fires going in Saarbrücken, Neunkirchen and Homburg, and also made great gaps in the lines of the "dragon's teeth" which had been planted to hold up the Allies' tanks.

The attacks of the *Luftwaffe* on the 1st Army's bridge at Remagen were all failures, up to the date of writing, but German artillery scored some hits on the bridge. These did not put it out of action, and soon American engineers were able to report that it was in better condition than when first captured, as some damage done by Allied attacks had been made good. At the same time, a pontoon bridge was thrown across the Rhine beside the railway bridge. American forces poured across the river, and advanced into difficult country, driving the Germans before them. In fact, all along the Rhine front the air arm, after being grounded and helpless for so long, was enabled by the fine weather to give full help to the armies on the ground. It was the state of affairs for which we had all been hoping; and with the spring coming on apace the part played by the air in the great battle is likely to grow ever more potent.

AIR IN THE WAR : Miss Jean Neville, of E.N.S.A., entertains R.A.F. airmen and British troops near Mandalay.

SUNLIGHT & SHADOW : Burmese bearers on an R.A.F. airstrip in Central Burma shelter under the wing of a Dakota from the midday sun. In the background are boxes of airborne supplies and two recce Mosquitoes.

"Grievous Loss"

AT such a crisis it was only to be expected that rumours would get about that Rundstedt had asked for an armistice, and that German agents in Sweden had thrown out some peace feelers. Whether there was any truth in any of these rumours or not, the Allied position remains firm. It demands unconditional surrender. Gen. Dittmar, the German wireless commentator, admitted "the grievous loss of vast German lands," but he said that if the Germans adapted themselves to present conditions, they could find enough man-power to garrison their inner lines. They will hardly do that if they leave substantial armies to be cut off by the Russians, as has happened in so many cases. Rundstedt, it must be admitted, is not given to that form of folly. When he finds a position hopeless he withdraws, and he

WAR IN THE AIR

has been successful in getting the bulk of his forces over the Rhine. But to prevent the Allies from following him is quite a different matter.

South of Mayen the Americans recently captured a site for launching flying bombs. The civilians in the neighbourhood said that the first 11 launched from there had only travelled about a mile each, and then had exploded, doing much damage. The story has also been told that German defaulters are now condemned to join squads for launching rocket bombs, a job which is evidently considered especially dangerous. It is to be hoped that the story is true.

Round Danzig the Red Air Force has been busy, and has started many fires in the towns which the Russian armies have approached as they close in. The same applies also to the advance on Stettin. The storming of Küstrin has once more awakened all the German fears for Berlin—though one can imagine that many dwellers in the place would be only too glad to have it occupied, as that would put an end to the relentless series of attacks by Mosquitoes with their 4,000 lb. bombs. German air-raid shelters are very solid, we have been told; but to live in one constantly for months on end must be a very sordid existence.

Superb Teamwork

THE fine weather of last week-end brought a terrific hustling of the Germans in the Battle of the Rhine. In the words of the correspondent of *The Times* on the Moselle front, "We are again witnessing superb teamwork by armour, infantry, artillery, and the Tactical Air Forces." Gen. Patton has again been given a chance to show his taste for speed, and his armour has been ranging over the area between the Moselle and the Rhine. The 19th T.A.F. has reported that the Germans were fleeing eastward in great confusion, many of their columns evidently not knowing what was happening or where the Americans were. Some of the enemy columns were blindly heading in directions which would lead them into the worst possible trouble. Their commanders must bitterly regret the incapacity of the *Luftwaffe* to provide them with any information.

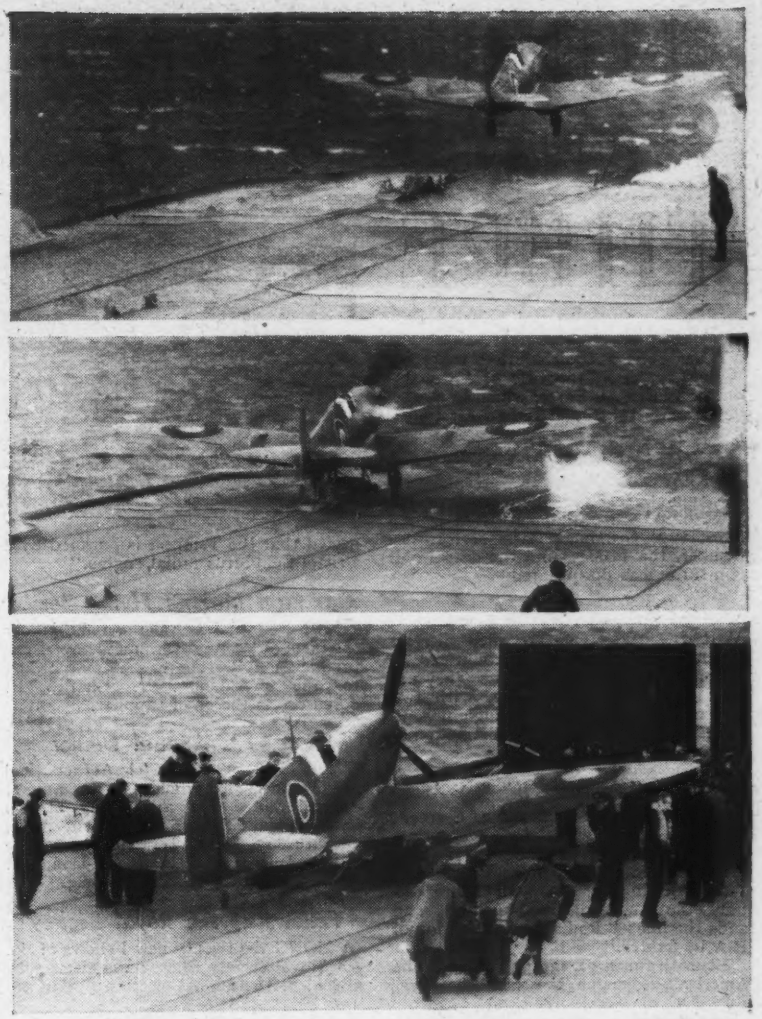
A shadow of coming events was cast by Gen. Eisenhower's warning to the inhabitants of Frankfurt-on-Main, Mannheim, and Ludwigshafen, urging them to fly from the wrath to come. Heavy bombers are going to deal with those cities.

While the battle raged in the air and on the ground, Berlin on last Sunday suffered its heaviest daylight attack to date, when 1,300 heavy bombers from the U.S. 8th Air Force spent over an hour raining down salvoes of 30 tons of bombs every 30 to 40 seconds on railway yards near the centre of the city, and the great armament plants in the suburbs. Night brought no relief to the place, for Mosquitoes then raided it. Bomber Command Lancasters made some daylight attacks on benzol plants in the Ruhr, and in all directions the air power of the Allies was brought to bear on Germany.

Bomber Command seems now to work as much by day as by night; although Commander Brabner, the new Under-Secretary for Air, told the House of Commons the other day that under the latest developments it had been found that it was probably more accurate to bomb at night than by

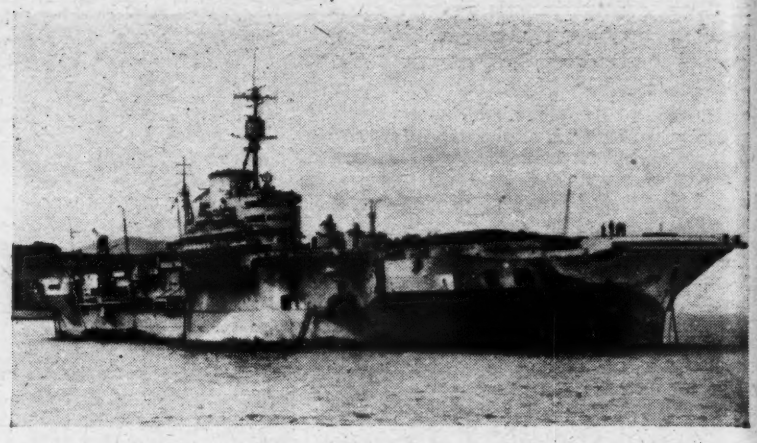
This terrific air activity by the Allies seems to have prodded the enemy into sending normal bombers once more over northern England. They used fragmentation bombs, which do little harm to buildings but are meant to kill people, and they did kill a certain number.

Coastal Command was also busy over the week-end. On Saturday night numbers of E-boats stole out into the North Sea, but were promptly spotted by some patrolling Wellingtons. They called up the Navy, which sent out a force which quickly drove the E-boats back. They turned and fled, but were pursued by Wellingtons from Great Britain, and intercepted by naval Swordfish from Belgium. The precise results of our attacks could not be identified; but the object of the E-boats was clearly defeated.



ACCELERATED TAKE-OF: A sequence of three photographs showing a Seafire making an accelerator-assisted take-off from the flight deck of an aircraft carrier. At the bottom the Seafire is being attached to the trolley. The windshields are raised to make working conditions reasonable as there is always 30 knots of wind over the deck. In the middle photograph the Seafire is being accelerated. Wing flaps are down about 20 deg. At the top the trolley has reached the end of its travel and collapsed forward. The Seafire is flying and the wind indicator steam jet is momentarily blown off centre by the slipstream.

HERE AND THERE



THIS IS H.M.S. *IMPLACABLE*: Britain's latest aircraft carrier to go into service (and sister ship of the *Indefatigable*,) which was recently launched on the Clyde by the Queen. Both carriers were laid down in 1939.

R.I.A.F.

IT has been announced that the King has conferred the title of "Royal" on the Indian Air Force, which from now on becomes the Royal Indian Air Force.

Avenger Modification

A NEW cabin top of the "greenhouse" type but shaped like an extended "teardrop" in outline, is fitted to the latest type Grumman Avenger torpedo-bomber, the TBM-3, and the dorsal ball gun-turret has disappeared.

Arado "Jets"

ARADO Ar 234 jet-propelled aircraft have recently been encountered in action on the Western Front. They are very similar to the Me 262, with two underslung jet units and a single fin and rudder, but have the useful distinction of an abnormally long fuselage.

"Tempest II"

UNDER the above heading, a recent issue of *Canadian Air Cadet* prints silhouettes of the Mustang P-51D, but gives the following dimensions: Span 41ft., length 34ft. 6in. (which are certainly not those of the Mustang), and adds the line: "Radial engine version of R.A.F. fighter."

Beneath this a paragraph reads: "The American magazine *Newsweek* has suggested that the Tempest is powered by a Bristol Centaurus radial engine."

Car Firm Making Flying Bombs

THE well-known American motor car firm of Willys-Overland is now mass-producing flying bombs, and, according to the president, Mr. Charles E. Sorensen, is the chief supplier.

S.M.A.E.'s Annual Dinner

THE Society of Model Aeronautical Engineers is holding its annual dinner, dance and prizegiving at the Lysbeth Hall, Soho Sq., London, W.C., on Saturday, March 31. Tickets may be obtained from Mr. F. E. Wilson, 34, Babington Road, Hendon, N.W.4.

Fellows of the Royal Society

AMONG the twenty new Fellows of the Royal Society whose names were submitted at the annual election to-day are those of Mr. W. C. Farren, director of the Royal Aircraft Establishment at Farnborough, and Mr. B. N. Wallis, chief of the Vickers-Armstrong's aircraft research and development section, whose latest achievement is the 22,000 lb. bomb.

Buried Treasure

IT has been recently disclosed that when British Forces were compelled to retreat in the Western Desert, many Merlin engines which had to be left behind were buried. Then, when Montgomery advanced from Alamein and the airfield was retaken, they were dug up and flown back to Cairo by Dakota for overhaul.

February's Total

R.A.F. Bomber Command dropped a total of 45,750 tons of bombs on enemy targets during the month of February, which provided the best month of night-flying weather since last September.

Attacks were made on 24 nights.

Power and Politics

LT. PETER CADBURY, Fleet Air Arm, who is at present engaged in test-flying jet-propelled aircraft for the Gloster Aircraft Co., has been adopted as prospective Liberal candidate for Stroud.

He is the son of Air Comdre. E. Cadbury, D.F.C., D.S.C., who, when a major in the R.F.C., brought down the Zeppelin L.70 off Yarmouth during the 1914-18 war.

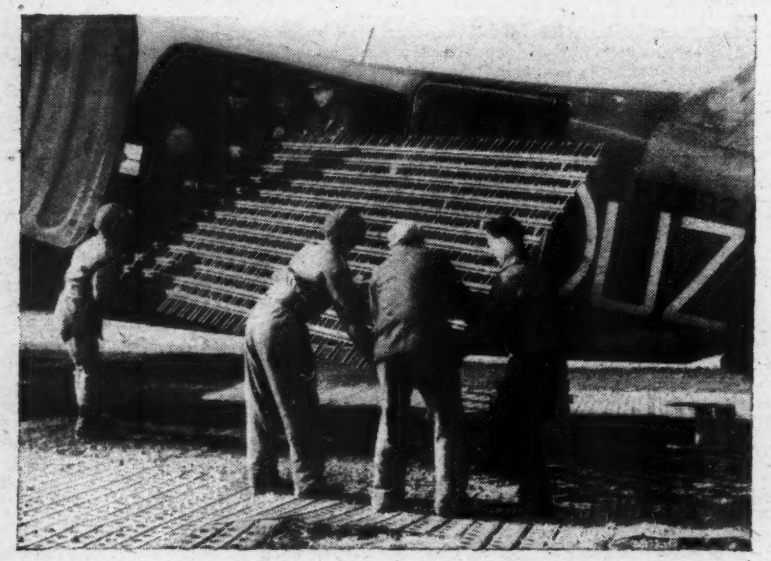
Down the Slipway

"THE largest aircraft carrier in the world, the 45,000-ton U.S.S. Midway, will be launched this month at Newport, Virginia," the U.S. Navy Department recently announced, according to New York Radio.

"Named in memory of the battle of Midway, the giant carrier will accommodate more than eighty aircraft, which may be twin-engined," the broadcast added.

Skymasters to Go Into Action?

SPEAKING of the new large-scale airborne operations now being planned by the Allies, General W. D. Old, Chief of U.S. 1st Troop Carrier Command, said that "huge four-engined



MAGIC CARPET: As reported on page 315, Dakotas of Transport Command recently carried their own runway with them to Belgium. This picture shows the 6ft. × 12ft. strips, each weighing 185 lb. being loaded into a "Dak."

HERE AND THERE

cargo planes, previously used for transport between the U.S. and the war theatres," would be employed. They would be used to tow the latest gliders, carrying "big tanks and heavy guns."

Gen. Old was possibly referring to the C-54 Skymaster.

G.A.P.A.N. Dinner

THE 15th annual general meeting of the Guild of Air Pilots and Air Navigators of the British Empire—more compactly known as "Gapan"—will be followed, on April 5th, by a members' dinner in the evening.

The venue is the R.Ae.S. premises at 4, Hamilton Place, London, W.1, and the meeting starts at 3 p.m. Those wishing to attend are asked to communicate with the Guild at this address.

R.Ae.S. at Luton

SIR FREDERICK HANDLEY PAGE was the chief speaker at the March meeting of the Luton branch of the R.Ae.S., and he stressed the importance of training young men in aeronautical engineering. Sir Frederick's talk was followed by a lively discussion launched by Mr. C. L. Cowdrey.

Next meeting of the Luton branch will be on April 4th, when Mr. A. V. Cleaver, of de Havillands, will speak on "Propeller Development."

A.T.C. National Rally

A NATIONAL rally of the Air Training Corps is to be held in London from May 12th to 14th, and is to be linked up with the Corps' two big sporting events, the England *v.* Scotland football match at Tottenham on the Saturday, and the National Boxing Championships at the Albert Hall on the Monday. A special church parade will take place on the Sunday.

Detachments visiting London for this gala week-end will be accommodated under the auspices of London Command A.T.C.

R.R. Jet Development

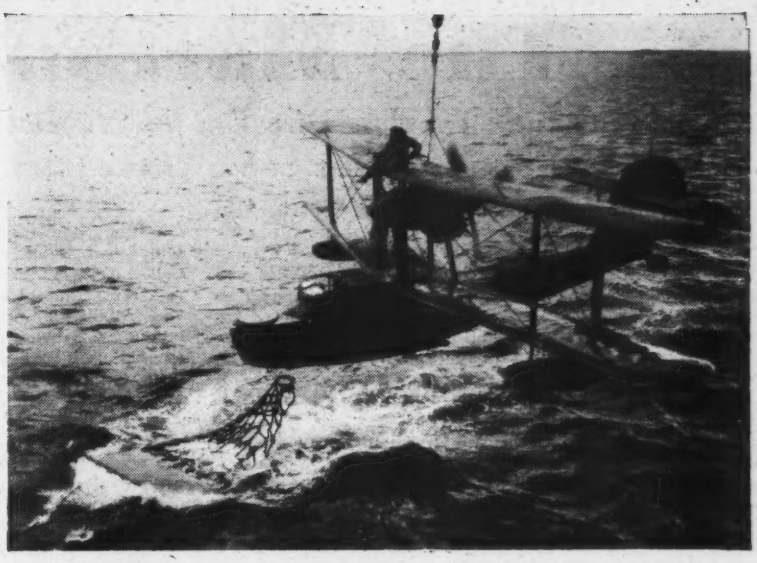
ROLLS-ROYCE, LTD., have been interested in jet-propulsion engines since 1938, and in 1939 started design work on their own account.

In 1940, at the request of the Ministry of Aircraft Production, the company collaborated very closely with the original firm of Power Jets, Ltd., providing facilities for the manufacture and development of the Whittle-type engine.

After the first demonstration flight in the Gloster E.28 machine further flight development work became necessary, and later types of Whittle-design engines passed through their tests at the Rolls-Royce Experimental Flight Establishment.

During the flying-bomb attacks on this country in 1944 the jet-propelled aircraft which were used to combat this weapon were powered by Whittle-type engines, developed and manufactured under the control of Rolls-Royce, Ltd.

At the present time the design and development of these units is proceeding.



NET RESULT: A Walrus being hoisted aboard its parent ship after taxying on to the special towed net to which it hooks itself and is thus held in position beneath the boom while the ship continues under way.

A Westinghouse Jet

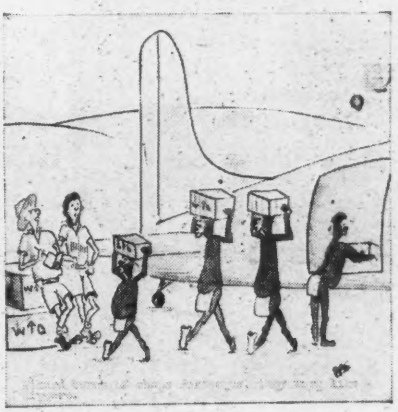
WESTINGHOUSE are reported to be developing a jet-propulsion engine for the U.S. Bureau of Aeronautics (Navy Department), which is described in a recent issue of *Western Flying* as "the first jet-propulsion engine in this country free from foreign influence."

When the development is completed, the new engine is "expected to produce more pounds of thrust for a given amount of fuel and pounds of weight than any engines brought from Europe for study."

We might excusably add, perhaps, that development has also gone a long way ahead in Britain since the original Whittle design was passed over to our American Allies for study.

Spurt in Squirts

BUT aside from the unfortunate tendency among a certain minority of transatlantic journals to minimise Britain's technical contributions to Allied progress in this department, the above report ties up with the recent announcement that emphasises the tremendous increase in the production of jet-propulsion units for U.S.A.A.F. combat aircraft—that the G.E.C.'s plant at Syracuse now devotes 600,000ft. of floor space to the manufacture of "squirts."



"Wizard bunch of chaps, Fortesque, they work like niggers!"

Early Doors This Way!

TAYLORCRAFT (U.S.A.) have recently announced an attractive post-war "family" four-seater high-wing monoplane complete with price. It is the Model 15 described as "intended for the $4,000 price bracket, making it the lowest priced aircraft of similar seating and carrying capacity to be announced and flown thus far."

Powered by a horizontally opposed engine of 125 h.p., it has a top speed of 125 m.p.h., and a duration of 5½ hours at a cruising speed of 112 m.p.h. It lands at 40 m.p.h.

It has a car-like four-door cabin and is equipped with dual control, electric starter, generator and two-way radio.

Unanimous

WAYNE PARRISH, the forthright editor of our contemporary, *American Aviation* (whose personal acquaintance *Flight* was happy to make when he visited England last year) makes an astute observation on the Chicago conference in an article in the February issue of *Canadian Aviation*.

Drawing attention to the fact that the Press of America, Britain and Canada all described the conference as a failure, he says: "In view of the gloomy unanimity of these Press comments, I think we can be safe in assuming that the conference was quite a success."

There was more than just humour in this, for he shrewdly adds, "The British say it was a failure because the U.S. won what it wanted. Our Press says the British came out on top. Apparently the Canadian view is that Canada being in the middle, it got smacked from both ends."

Maybe you've got something there, Mr. P.I

D

The Marconator

A Semi-automatic Wireless Direction-finding Device for Use in Aircraft

By CHARLES B. BOVILL, A.M.I.E.E., A.M.Brit.I.R.E.

ALTHOUGH recent public statements indicate that Radar will eventually be the means of providing the greater part of navigational aid for aircraft, it must be realised that when hostilities cease these facilities will not be available throughout the world, and that it can be expected that some years will elapse before the necessary ground installations can be working on an organised basis.

It is, however, likely that broadcasting stations will be working in all civilised countries within a few months of the end of the war, owing to the fact that very many of them are intact still, if not working.

As is already well known, any wireless transmission on long or medium waves can be used for navigational aid by an aircraft equipped with wireless direction-finding apparatus. Just how useful an aid radio signals are considered to be can best be judged by the precautions taken by the enemy when an Allied air raid approaches the Reich. Under such conditions "technical hitches" occur at broadcast stations, which are almost invariably followed by them going off the air; these tactics are, of course, solely intended to prevent our aircraft from using the signals for direction-finding purposes.

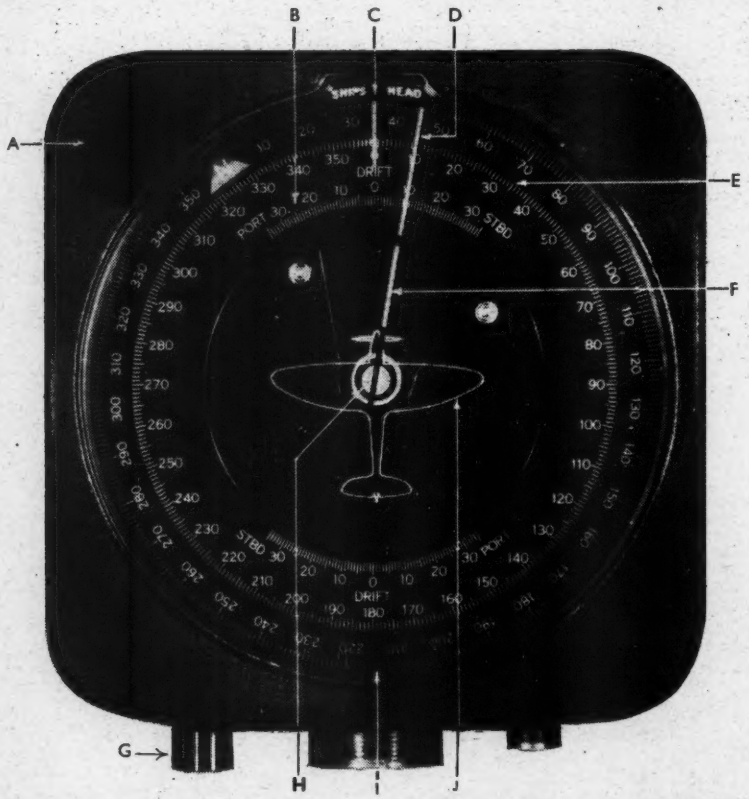
In pre-war days the uses of wireless direction-finding were fully recognised, and many aircraft were fitted with loop equipment which was extensively used. It must be admitted, however, that the use of such equipment presented complications and called for the closest co-operation between the radio operator and the pilot of the aircraft. A certain amount of calculation was also required, all of which took time and led to errors in the final result. The outcome of this was that while loop navigation was considered useful, it was not generally regarded as being a primary navigational aid.

Wartime Development

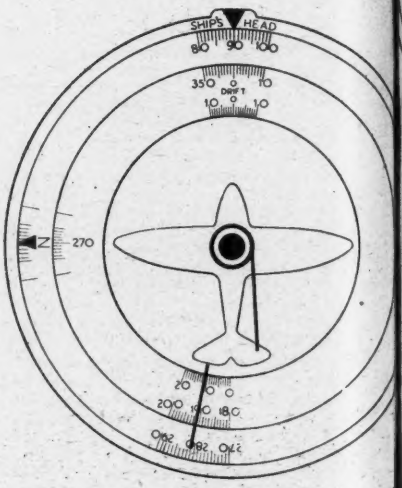
During the war much development has taken place in the whole technique of direction-finding, and many of the hitherto less well understood problems have been fully investigated. This work has made possible considerable improvements to apparatus and to aircraft installations. Among these are receivers which are more simple to operate, and visual indication of bearings in place of the old method of aural indication, in which the operator had to swing the loop to the position at which no signal was audible in order to obtain a bearing. Research has also been carried out into the causes of inherent errors of loop installations in aircraft, such as quadrantal errors, which cause bearings to crowd or spread in various parts of the scale. The overall result has been a general improvement in the accuracy with which bearings can be taken from loop readings in an aircraft.

By a combination of the latest radio technique with the repeater master compass, a device has recently become available with which loop bearings of a very high order of accuracy may be obtained from any receivable signals on medium or long waves, all without calculations and consequent delays and risk of errors.

This device is known as the Marconator and is a development due to Marconi's Wireless Telegraph Co., Ltd., Chelmsford; it is designed for use with the standard Air Ministry



General view of the Marconator: (A) Cover of keyway for initial alignment of compass repeater scale; (B) Drift scale; (C) Head of aircraft with respect to true north; (D) Cursor; (E) Fixed scale, showing bearing relative to aircraft's head; (F) Visual indicator needle (shown aligned with Cursor); (G) Illumination dimming control; (H) Signal amplitude monitor, shown in correct central position; (I) Distance-reading-compass repeater scale (true); (J) Fixed silhouette of aircraft, providing mental picture of orientation.



1. Chance position of Cursor at start. Turn Cursor *towards* Needle.

direction-finding receiver, and it can be said of it that it overcomes the majority of the shortcomings of aircraft direction-finders.

The radio technicalities of this apparatus were described in the *Wireless World* for January, 1945. It is unnecessary to explain these details here, the chief purpose of this article being to suggest some of its practical applications as a navigational instrument.

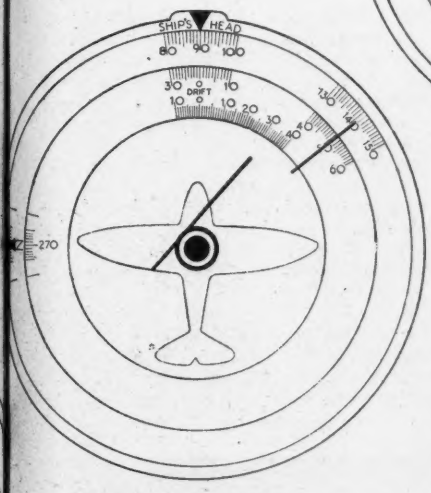
The outstanding features of the Marconator are the following:—

(a) All calculations are eliminated, a direct reading of the true bearing of the station received being given with all corrections made for magnetic variation, compass deviation and quadrantal error.
(b) Automatic "sensing" of bearings, thereby avoiding 180 deg. ambiguity.
(c) Operation independent of pilot.
(d) Visual indication of bearing.

The way in which this is accomplished is fairly simple to follow if reference is made to the photograph of the instrument. It will be seen that there are two scales engraved 0 to 360 deg. and a third scale engraved 35 deg.-0-35 deg. The outer scale is a repeated reading of the master compass, and is capable of rotation through 360 deg., the reference point being the lubber line seen at the top of the instrument.

The inner scale is the loop scale and is fixed, it being traversed by the loop pointer from which can be read the loop bearing relative to the aircraft's head.

In the photograph the loop pointer will be seen pointing to 10 deg. on the loop scale; it will also be seen that the loop pointer covers the outer or compass scale and is pointing to 45 deg. Thus the true bearing of the source of signal can be read direct when the loop is turned to the correct position.

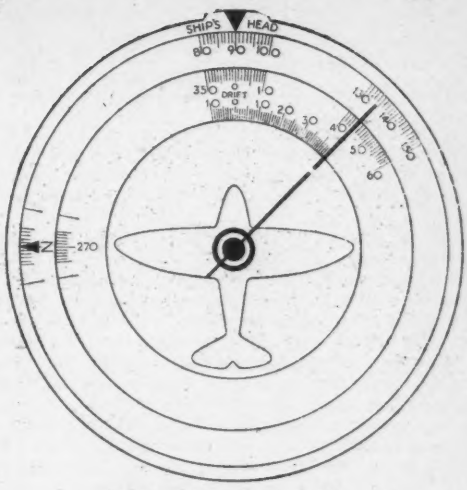


3. Bearing over-shot. Turn Cursor *towards* Needle.

2. Approaching the Bearing — Needle about to line up with Cursor.

The method of ensuring that the loop is turned to the correct position is ingenious. As has been previously explained, the bearing is nowadays shown visually. The designers of the apparatus have, therefore, arranged for the visual meter to be attached to the mechanism which turns the loop pointer, and have arranged its needle to align itself with the loop pointer when in the position corresponding to the bearing and to read out of alignment when off this position.

It will be apparent that this simplifies the operation of taking a bearing very considerably, as it is only necessary, once the signal has been tuned in, to turn the loop drive so that the pointer moves in the direction in which the visual needle is showing until the loop pointer and visual needle are in alignment.



4. Bearing determined—Cursor and Needle aligned.

When this condition is satisfied, the true bearing of the station being received may be read off the outer scale of the instrument. Due to the circuit design, merely turning the loop towards the direction in which the visual needle is pointing ensures that the "sense" is correct.

The diagrams illustrate an example of the loop pointer and visual needle positions during the operation of taking a bearing.

Being a centre-zero instrument, the visual meter can be likened to the ammeter of a motor car. It will be understood that if the station went off the air the operator might think he was obtaining a bearing when actually the meter was inoperative, since the inoperative and on-course or bearing indications are both when the needle is in the central position. This danger has been overcome by the inclusion of a tell-tale indicator in the centre of the dial, which shows at once if the transmission ceases.

Intersecting Pointers

The visual indicator is duplicated in the pilot's cockpit instrument board, where it is used for homing purposes. The danger referred to with a central-zero meter is in this instance overcome by using a double-needle type of indicator. This instrument is arranged to have intersecting pointers which intersect centrally when flying a homing course, and both point to either left or right if the correct homing course is deviated from. The convention now accepted is for the needles to point in the direction of the station when a deviation is made. The advantage of the double-needle instrument is that if the signal ceases both needles collapse and thereby give an immediate indication to the pilot which would not be apparent with a single-needle indicator. This type of instrument is well known in this country, and is generally known as the "drunken man." The combined mechanical accuracy of the master compass repeated scale, the loop mechanism and the Marconator provide an overall accuracy of 1 per cent., according to the makers.

In its simplest application of taking bearings from which a "fix" can be obtained, the following procedure would be necessary: Before the flight the wireless operator or navigator would select suitable stations along the route

THE MARCONATOR

to be flown which could be expected to be in range. He would then mark the receiver tuning scale with points at which they could be tuned in. When a "fix" was required, the first station would be tuned-in and its true bearing noted, using the procedure already described. The other two stations would then be tuned in and similar procedure used. As the only operations necessary are to tune in the signals and rotate the loop until the loop pointer and the visual needle are in alignment, an operator should be able to get a reliable and accurate "fix" in about one minute.

The system of homing was often used in peacetime, particularly by Continental pilots, owing to the fact that the main broadcasting stations were usually located near the capital cities and often close to the airports which served these cities. This type of radio guidance is useful but is not economical, as it does not usually guide the aircraft in a striaght line to the source of signal, due to the effects of cross winds.

A Straighter Course

Using this form of guidance, it will be remembered that the pilot follows a homing meter on the dashboard which indicates "on-course" and the general direction—left or right—if the aircraft deviates off course. All that the pilot has to do, therefore, is to steer the aircraft in such a way as to keep the homing meter pointer reading "on-course."

When using the Marconator a straighter course can be flown, with a consequent saving in petrol and, of course, with the advantage that the aircraft is, if flying on a regular airline, over known terrain.

The method of doing this is simple, and the following example is taken: Assume the bearing of the station to be homed upon to be 90 deg. true; a cross-wind to be blowing from the south at the altitude of the aircraft; and the pilot to have started homing by use of the visual meter.

Due to the cross-wind the aircraft will be blown to the left of the straight track, and the pilot, following the visual meter indications, will correct course in order to get the needle back to the "on-course" position.

The wireless operator or navigator will observe that the course being flown is no longer 90 deg. true, and will reset the loop pointer to 90 deg.; this will cause the pilot's meter needle to reach off course to the left. The pilot will then regain the "on-course" condition by manœuvring the aircraft, which will make the loop pointer once more off the 90 deg. reading. The operator of the Marconator will continually reset the loop pointer to 90 deg. until stable conditions are met. During this operation, what has actually been happening is that the operator of the device has been reducing the angle to the straight track which the aircraft would have flown with normal homing methods.

Another type of operation which can be carried out with the Marconator is flying on a back bearing. The following example shows how this would be done and also indicates the uses of the 35 deg.-0 deg.-35 deg. drift scale. Assuming that the aircraft is required to fly away from a point bearing 90 deg. from a broadcasting station, and that the wind direction is not known, the procedure would be first to home to the broadcast station in the manner already described.

Back Bearing

At the moment when the aircraft is directly over the broadcast station to which it has homed, the pilot's meter needles will collapse for a few seconds due to "cone of silence effect"; this will establish the pin-point from which the track is to be made. At this point the operator of the Marconator will set the loop pointer to 180 deg., and the pilot will steer the aircraft on a course of 90 deg. true.

After flying for a short time the change in back bearing will be observed, using the drift scale, and when the new true bearing becomes reasonably stable the angle of drift and its direction can be read directly from the astern drift scale. The required track can then be regained by the usual method of applying to the compass reading twice the measured drift angle. If the result of this calculation shows a return to a back bearing of 270 deg. true, the compass course can be remade with allowance for drift angle.

There are obviously many other applications for this device which will at once be apparent to air navigators and pilots; doubtless others will follow as operational experience is gained, as is the way with all new apparatus.

Post-war Navigation

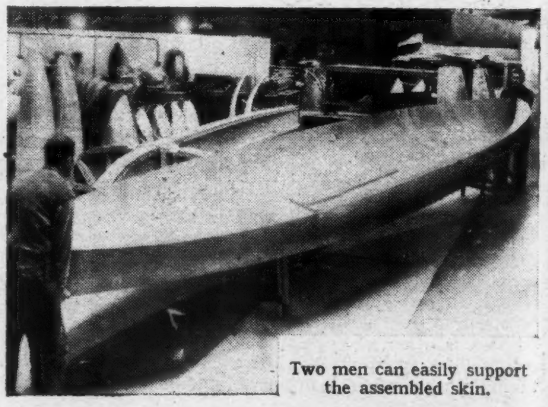
Information is not yet available as to what system will be used for aircraft navigational aid after the war prior to the establishment of the projected Radar scheme; it would appear, however, that now reliable and accurate aircraft direction finders are obtainable navigation by bearings taken in the aircraft should be considered seriously as a primary source of navigational aid.

It is evident that from an economical standpoint the cost of a radio beacon at each main airport, transmitting a coded signal with superimposed voice broadcasts of meteorological information when necessary, must have advantages over a fully manned ground direction-finding system, such as was used throughout Europe before the war.

In addition to this, the apparatus used for airborne direction-finders occupies less space than the type of equipment which was used in peacetime for transmitting signals to the ground for the purpose of taking bearings and "fixes" and represents an increase in pay load.

LIFEBOAT'S MOULDED PLYWOOD SKIN

IN *Flight* of January 18th, 1945, we gave a description of the airborne lifeboat. This genuinely seaworthy, well-provisioned and fully-equipped vessel is slung externally underneath the fuselage of the Vickers "Warwick" aircraft and dropped by parachutes to "ditched" aircrews who have been forced to take to their ordinary rubber dinghies. The boat is powered by two 5 h.p. Britannia "Middy" outboard engines mounted inboard with their vertical shafts passing through the hull. Economy in weight would obviously be a great asset in the construction of these lifeboats, and it is not surprising, therefore, that a recent development incorporates the plastic element in the form of an experimental moulded plywood skin. The work was entrusted to Merron, Ltd., the pioneers of moulded plywood technique in this country, and considering that the boat is 30 feet overall with a 6ft. 6in. beam, the result can be considered something of an achievement. Actually the completed skin weighs but 380 lb., a considerable reduction in weight compared with normal construction. This economy is, moreover, accompanied by considerably increased strength.



Two men can easily support the assembled skin.

CIVIL AVIATION NEWS

100 AIR LINES

MORE than one hundred airlines have been opened by the Northern Directorate of Civil Aviation, said Moscow Radio. "The main line will link Leningrad with Moscow," the report added.

"A regular passenger and goods transport is being established linking up Moscow and Leningrad with Vologda, Archangel, Murmansk, Kalinin, Novgorod, Velikie Luki and Kolym. Aircraft will also fly between Leningrad, Petrozavodsk, Stalino and Riga."

JOINING UP

A JOINT company for the development of the Isle of Wight air services in equal partnership has been formed between Portsmouth Aviation, Ltd., and the Railway interests. This is the result of negotiations between the two groups held on the suggestion of Lord Swinton.

U.S. COMMENT

A SHARPER edge has been given to the dispute in U.S. Congress circles over the future of American airlines by the British Government White Paper on plans for British civil aviation.

The principal issue is whether there shall be a single American flight company operating internationally as a "chosen instrument" or a zone arrangement with regulated competition, on the British pattern.

Two Senate Committees—Commerce and Foreign Affairs—are now thrashing out the problem.

The U.S. Civil Aeronautics Bureau and Pan American Airways have declined to comment on the White Paper, but well-informed air quarters have seized on the fact that Britain has few civil aircraft in prospect of production in the near future as the prime weakness of the British plan.

The *New York Times*, says the U.S., is in an excellent position both to meet and anticipate British competition, as "Army and Navy transports are already flying cargoes to almost every point envisaged by the British scheme on schedules far greater than those mentioned in London."

It is believed here that this statement of British policy will lead to the prompt opening of bilateral negotiations between Britain and the United States, which, under the Chicago Agreements, will be necessary before either country can start its service.

U.S. AVIATION BILLS

EIGHT aviation bills designed "to promote world leadership by the U.S. in aviation after the war," are coming before open sessions of the U.S. Senate Commerce Committee.

One of the first of the bills to be discussed at the hearings calls for the expenditure of 80,000,000 dollars a year for ten years "to bring about the establishment of a nation-wide system of public airports adequate to meet the present and future needs of civil aeronautics." Under the bill fund grants will be made to States, their poltical sub-divisions and other non-Federal public agencies for the development of public airports.

Another bill is designed to create an independent civil aeronautics authority and an independent air safety board, to promote the development and safety and to provide for the regulation of civil aeronautics.

An independent civil aeronautics authority originally was set up under the Civil Aeronautics Act of 1938, but under a reorganisation of 1940, it was separated into the Civil Aeronautics Board and the Civil Aeronautics administration under the Department of Commerce. The functions of the Air Safety Board were absorbed by the Civil Aeronautics Board.

The U.S. State Department, in a letter from Mr. Joseph C. Grew, Acting Secretary of State, strongly opposed the establishment of a "community company," declaring that previous experience indicated that it would lead to a "government-owned system," and the Civil Aeronautics Board, the War Department, the Navy Department and the Commerce Department have expressed similar sentiments.

Other bills scheduled for hearings before the Committee are to provide adequate aeronautical training for the youth of the U.S., to aid the development and construction of civil aircraft and its use in world air commerce, and to enact the aviation "salvage at sea" convention into statute law in the U.S.

Mr. Henry A. Wallace, U.S. Secretary of Commerce, urged for "prompt action" on aviation bills, and estimated that within two years after the defeat of Japan aviation could give support to 200,000 workers. He estimated that ten years later 400,000 workers would be earning their living through aviation.

Within ten years after the war 44,000 persons would be employed in the production of 175,000 private aircraft a year for personal use. He considered the aviation section will be one of the most important units of the Commerce Department.

Mr. William A. Burden, Assistant Secretary of Commerce for Air, citing figures showing that 4,000,000 persons travelled by air in 1940, estimated that at least 100,000,000 persons a year would travel by air within the U.S. within the next ten years. He said that at least 3,000 airports would be needed within this period.

AIR CHARABANCS

NEW civil aircraft ready in June. Holiday tours in air charabancs, which will take the whole family for a fortnight's trip from place to place, will be possible soon after the war.

They are one of the "ingenious ideas" about cheap air travel envisaged by the railway companies, it was disclosed by Viscount Swinton, Minister of Civil Aviation, in the House of Lords.

"We could, for example, turn a Bristol Freighter into a charabanc," he said. "It could do short hops, and people would have much more time on the ground to do their sightseeing. It is a line we ought to be getting on to as soon as the war is over."

Pressed by Lord Rothermere for information of the progress of British civil aircraft, Lord Swinton gave this production timetable:—

Tudor I: A trickle of production beginning in June. Tudor II: A trickle in November. We ought to be getting a flow of production early next year.

V.C.I: A beginning, slow at first, at the beginning of next year, getting into its stride about the middle of next year.

We should produce as good civil aircraft as we had bombers, and he hoped to have a schedule of routes soon.

PROTEST

NOT till February 14th, when the plan had already been agreed between the Minister, the B.O.A.C., the Railways and Shipping interests, had independent operators been consulted on the Government policy.

The monopoly suggested by the White Paper will suffer from the lethargy of a Government instrument, the B.O.A.C., and from the Railways and Shipping companies having vested interests in surface transport, says a statement of the four independent airline operators. Criticising the White Paper, the statement says that the Minister's offer to the Independents was unattractive: "to deny a value for goodwill and development is undemocratic and akin to robbery."

The grant of licences created a vested interest which was recognised by the reported purchase last month of the goodwill of North-Eastern Airways by the Railways for £100,000.

RIOT

CALLING it both monopoly and collectivism run riot Grp. Capt. D. F. M'Intyre, Managing Director of Scottish Aviation Limited, strongly criticised the White Paper. Interpreting the war aims of the younger generation he thought that "it is precisely this kind of dictation which our youngsters are fighting this war to destroy."

There is little hope for aviation in Britain, he concluded, if its development is to be monopolised by the Civil Service and aviation's surface competitors.

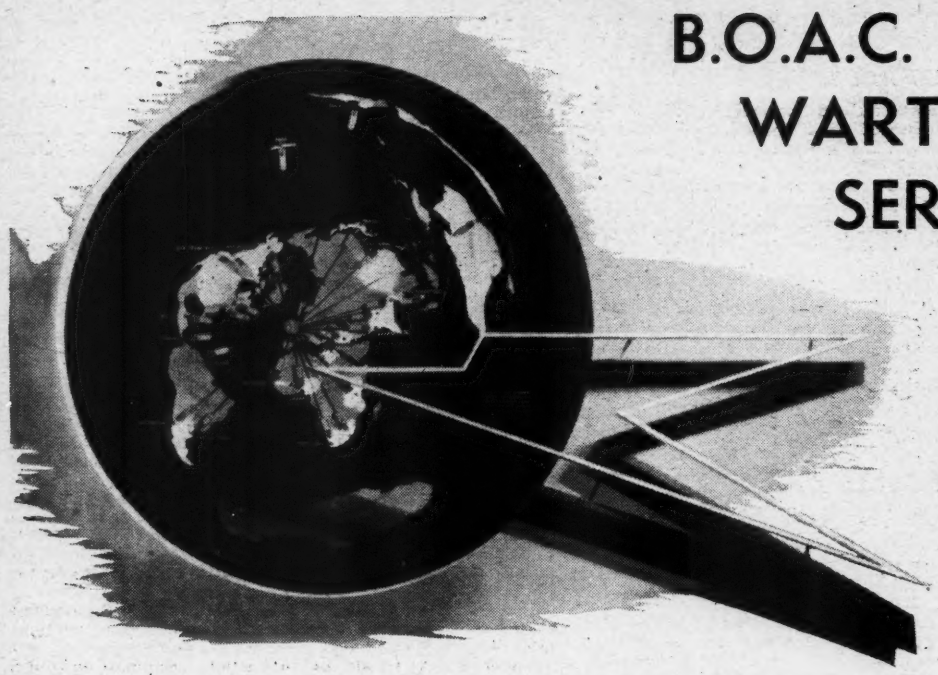
THE SHETLAND FLYING BOAT

WHILE no official data have yet been released on the projected Shetland civil flying boat to be produced jointly by Shorts and Saunders-Roe, an Australian journal some time ago published the following figures and information:—

Weight, 100 tons; cruising speed, 275 m.p.h.; range, 3,000 miles; power plant, four Bristol Centaurus engines.

Alternative figures for the Shetland gave it a maximum range of 4,000 miles with a petrol load of 23 tons "which would probably mean a 25 per cent. reduction in number of passengers carried, or accommodation for up to 220 passengers for relatively short flights—say up to 1,500 miles.

The journal stated that one passenger per ton seems to have been the accepted basis of payload.



B.O.A.C. WARTIME SERVICES

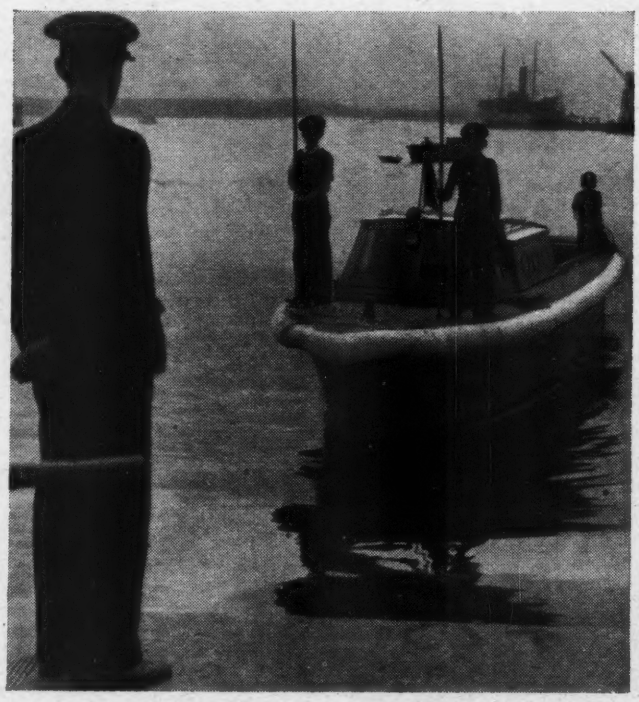
Linking t Commonweal World's Long Route : Atlan Operations

By
V. L. GRUBERG

IN last week's *Flight* a rough outline was given of the B.O.A.C.'s efforts to establish and maintain Commonwealth air communications. Not only have traditional Empire routes been maintained, but new ones have been established, often under the stress of immediate war conditions. But of all routes operated during the war, none bears better testimony to their high operational standards than the services to Australia and to the American continent.

Air transport allowed the Allies, who had to rely on long external lines of communication, to move supplies and personnel rapidly from one theatre of war to another, from the supply centres on the periphery to the zones of combat. But air transport relied on established functions and bases. The fall of Singapore was therefore a severe blow to the operation of the Australia service, and, with the occupation of the Malay Peninsula and Burma by the Japanese, air communication with the Anzac Dominions was severed. The shooting down of the Qantas flying boat *Corio* near Koepang on January 30th, 1942, marked the snapping of the England-Australia service.

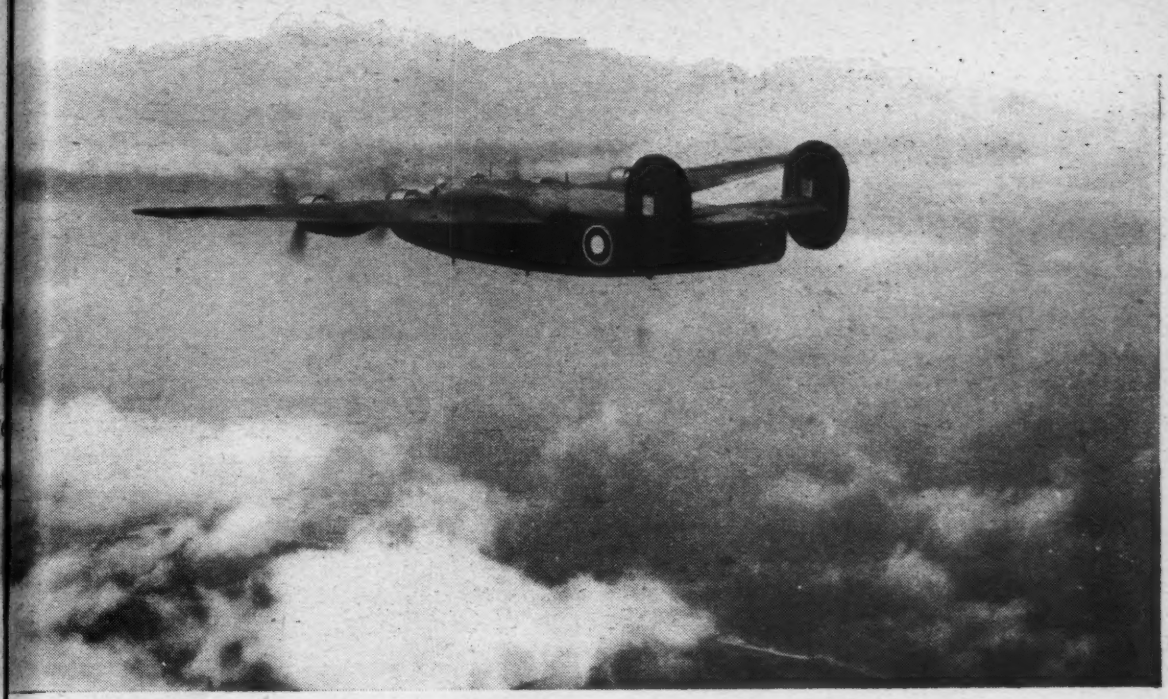
The re-establishment of this air route is in itself one of the air sagas of this war. In July, 1943, Qantas Empire Airways, one of the B.O.A.C. associates, opened a service from Ceylon to Australia with specially adapted Catalina flying boats. The service runs from Karachi through Ceylon, with one stop on the 5,089-mile journey, which is made in 41 hours. At Karachi it connects with the services to India, China, Middle East and, at Karachi, it also meets the service from the U.K., via Gibraltar-Jerba-Cairo-Habbaniyeh-Bahrein-Karachi to Calcutta, and connects with the important service, Cairo-Lydda - Baghdad-Basra - Bahrein - Tirani - Karachi - Jodhpur - Delhi - Allahabad-Calcutta.



FLOATING AMAZONS : Girls serve on B.O.A.C. launches which load and unload the flying boats.

The route involves a 3,513 miles sea crossing, the longest non-stop trans-ocean flight in the world, made even more hazardous by the complete absence of land between the starting and terminal point except for the Cocos Islands, which are a possible target for attack by the Japanese. By comparison, the longest trans-Pacific non-stop service is 2,407 miles from San Francisco to Honolulu operated by the U.S. N.A.T.S.

Over 60 per cent. of the non-stop crossing had to be made through enemy-patrolled territory. With the use of radio restricted to two hours after take-off and prior to alighting, course is maintained by astro navigation and dead reckoning. Because of absence of shipping, the Indian Ocean, which would normally assist in "met." forecasting,



WEST-BOUND : A Liberator starting on its flight across the North-Atlantic to Canada.

each aircraft then became a "flying met. station."

The Catalinas had to be specially adjusted and operated in extreme overload conditions to carry enough fuel for the long non-stop hop. Later, the Catalina services were supplemented by the "Kangaroo Service," operated with specially modified Liberators. The employment of land-based aircraft allowed the use of advantageously situated airfields for refuelling.

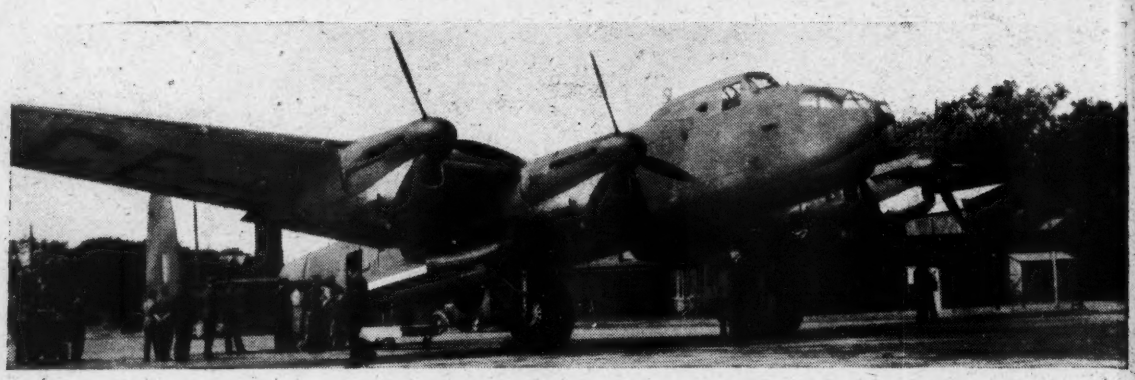
Yet, despite all these difficulties, ten months after the opening of the service the Indian Ocean was crossed for the hundredth time, the average time for the crossing being 27 hours.

The 15,000 miles England-Australia run carries the distinction of being the world's longest civil air route, and is operated now as a regular service by Catalinas and Liberators to Australia, linking up with the service to New Zealand, operated by another associate company of the B.O.A.C., the Tasman Airways.

The Atlantic Route

Perhaps the best example of the fruitful results of early pioneering in the air are the services operated by the B.O.A.C. across the Atlantic. The pressure of war needs has, of course, pushed British and American air transport

STINGLESS APPROACH : A Mosquito returns home from Sweden.



ALL PRIORITY: Passengers arrived from Canada disembarking from a Lancastrian at Prestwick airport. The two-way return Ferry Service has a record of four operational winters.

B. O. A. C. WARTIME SERVICES

across the Atlantic at a rate that only recently would have been considered unbelievable. But although a de-commercialised air transport undertaking can afford to skimp on extra safety margins necessary in normal civil operations, the crews of the B.O.A.C. engaged on transatlantic flights have given evidence of the highest professional skill.

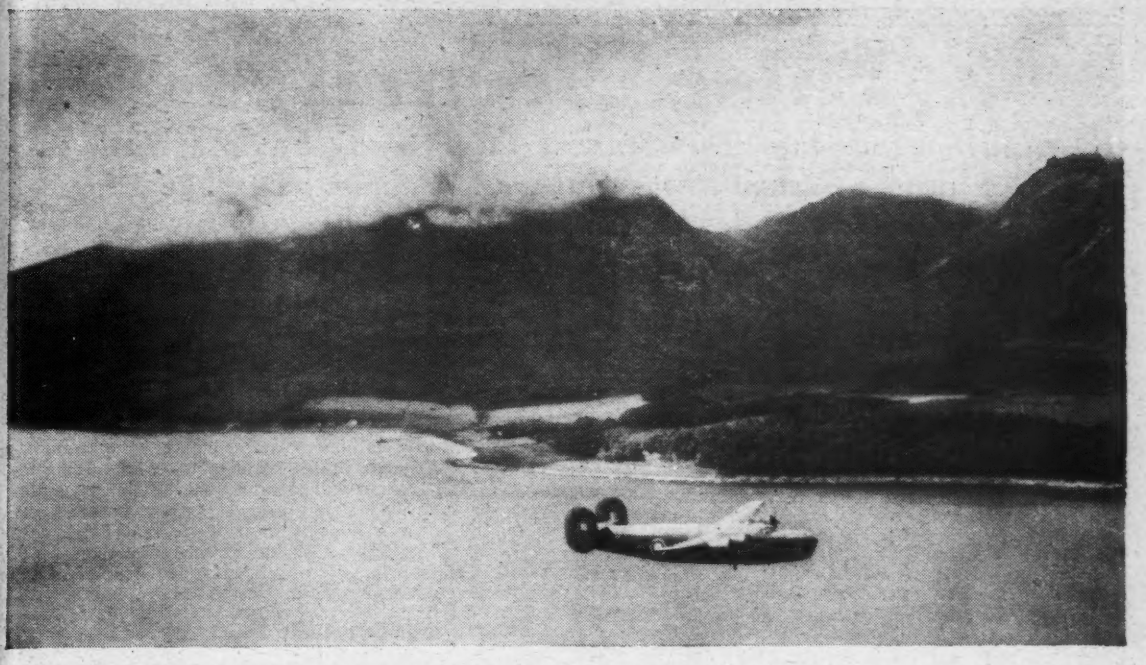
In autumn, 1940, the first U.S.-built Hudson bombers were flown to this country. Led by Capt. (now Air Vice-Marshal) D. C. T. Bennett, they touched down at a U.K. base after 10¼ hours' flight; this was the practical result of the investigations and careful planning of Col. Burchall and Captains A. S. Wilcockson, D. C. T. Bennett, I. G. Ross and Humphrey Page, seconded by the B.O.A.C., for this purpose.

But more was wanted. Since the return of pilots by sea to Canada would have entailed a serious loss of time, a two-way ferry service had to be set up. Its object was to transport back to Canada crews who deliver bombers and fly back with priority passengers and freight.

Never before 1940 had aircraft ventured across the Atlantic in winter. Aircraft are forced to seek altitudes of 20,000ft. or over to avoid icing. At these heights they

TRADITIONAL VIGILANCE: Passengers pass through the Customs at an airport in Britain. Traffic in both directions is heavy and in addition to urgent war supplies B.O.A.C. transatlantic services are used extensively by V.I.P.'s.

ATLANTIC JUNCTION: Gander airport, Newfoundland, an important centre of transatlantic air services.



HOME BOUND: A Liberator passing the coast of Arran after flying the Atlantic from Montreal.

B. O. A. C. WARTIME SERVICES

encountered temperatures of more than 70 deg. below freezing. The westward run involves specially difficult conditions, with head winds averaging 50 m.p.h. for the greater part of the 2,000 miles' flight.

In September, 1941, the two-way Return Ferry Service was taken over by the B.O.A.C. Now operated daily in both directions, with landplanes to Montreal, it is the only North Atlantic service having a record of four operational winters. For the year ending March, 1944, it recorded 3,011,358 capacity ton-miles.

Another important transatlantic service, established in 1941, is the Poole-Baltimore flying boat route. Envisaged as far back as 1939 when the late Sir Kingsley Wood told the House that " . . . arrangements were already in contemplation for the institution of a service across the North Atlantic," the actual realisation of the programme is largely due to a rather fortuitous turn in war conditions.

In May, 1941, three Boeing flying boats were purchased from Pan American—at a cost of about £250,000 each—to supplement the S-30's, *Clare*, *Champion* and *Cathay* for the then vital West African run.

The necessity to take the Boeings at frequent intervals to the U.S. for overhauls prompted the opening of the long overdue and badly needed regular transatlantic service in both directions. The Atlantic service which for the year ending March, 1944, provided a capacity of 1,563,856 ton-miles, operates in the summer on the U.K.-Foynes-Botwood-Baltimore route, and in the winter via Lisbon, Bathurst, Belem, Trinidad, Bermuda, Baltimore and return via Bermuda, Lisbon and to U.K.

It will be recalled that the pioneering of this North Atlantic route, now the subject of so much boisterous publicity whetting the appetites of the foot-loose tourist, is largely the work of Captains Wilcockson and Powell (now Air Commdr. Powell). Their research flights in 1937 led to the establishment in August, 1939, of the transatlantic mail service with the long-range flying boats *Cabot* and *Caribou* which closed on September 30th, 1939.

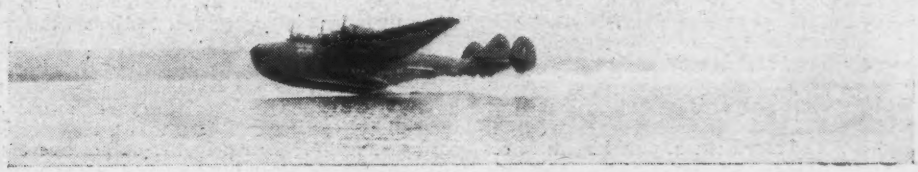
The increased demand for transatlantic air services and the resulting intensity of operations may be illustrated by the fact that the number of crossings made by the Boeings on the North Atlantic and South Atlantic routes was 185 in 1944, or about three times as many as in 1942. In other words, on the average more than three times in each week of 1944 a crossing was made by the flying boat alone. In the course of three years, 1942, 1943, and 1944, the number of crossings on the North Atlantic route was 193 and on the South Atlantic one, 111. The figures for Liberators are even more imposing: a total of 272 East and West crossings was made in 1942, 374 in 1943, and 553 in 1944.

The German conquest of the European continent had of course severed all air communication to European capitals. Nevertheless, the B.O.A.C. managed to keep the window open, by regular services to Lisbon and Stockholm.

The U.K.-Lisbon Service, established in August, 1940, operated under charter by the Royal Dutch Air lines (K.L.M.), was extended to Madrid in November, 1944.

One of the most daring feats of British air transport was the service from Scotland to Sweden, established after a short break in the initial phase of the war.

Successfully running the gauntlet of *Luftwaffe* fighters over the last 200 to 300 miles of the route, fast Mosquitoes were turned over to this unarmed but warlike duty, carrying high-priority freight or one passenger in the bomb bay. This was one of the most "hush-hush" of B.O.A.C. services. But there are still others shrouded by a veil of secrecy. The full story of British air transport's share in the war effort and its progress under difficult war conditions remains still to be told



"Indicator" Discusses the Special Dangers of a Sense of—

False Security

—And Suggests that This Sense is the Primary Cause of Flying Accidents : Custom as the Quietus to Caution : Developing New Standards of Good Flying Behaviour

THE longer one is concerned with this flying business, the more obvious does it become that its greatest danger lies in the sense of false security which continued experience engenders. Very rarely now—except through enemy action—are structural failure or fire experienced, and by far the most common cause of accident is one variation or another of an error of judgment. That, and nothing more.

Of course, the "errors" can be infinitely varied. The kind of personal and mechanical write-off resulting from a reckless low-flying exhibition cannot be put alongside the occasional transport catastrophe. The latter may, indirectly, be caused by an over-optimistic weather report and, more directly, by the failure either of part of the navigation equipment or the capacities of the members of the crew to cope with a difficult situation. But the two are allied and, in the final estimation of cause, the words "error of judgment" must inevitably appear.

And such errors are the direct result of something that can only be described as a false sense of security. Somehow or other, in the peacetime future, this sense must be curbed. Pilots, private and professional, must not only be educated to guard themselves against it in their training days but must be prevented from developing it as they gain experience, and disciplinary action must, for the sake of the general public as well as innocent passengers, be taken and widely publicised when cases of dangerous or careless flying are brought to the "court"—whatever this may be.

Professional and Amateur

No doubt the transport concerns will look after their own welfare, with or without the coercion of the insurance companies, and we need not fear that lack of discipline will be rife amongst pilots for whom a clear record is a career. But how are we going to deal with the gradually increasing number of amateur and semi-amateur pilots?

The very words "severe disciplinary action" give the average English person a sharp feeling of intense embarrassment, and the idea of a lot of pilots spying and reporting on one another is very much more than repugnant. Other nations may think nothing of writing reports (in triplicate) on their friends' or relations' behaviour in the air (or at any other time), but, however many imploring posters, articles and pamphlets were printed, asking us to be public-spirited in this particular way, nothing would induce us to take any concerted action. In fact, the average pilot, even if he thinks that a particular colleague's performance is criminally poor, will go out of his way, when asked to give evidence, to make the whole thing appear as the safest exhibition on record. Of course, there will always be the irate layman who will be only too glad to report anything that *he* considers to be reckless flying, but his testimony is likely to be of very low value.

Nevertheless, both prevention and cure must come, so to speak, from "within." Flying people themselves, and their ruling bodies, must be the witnesses, the prosecutors, and the judges. Somehow, pilots themselves must be made to feel that reckless, stupid, or careless flying is just "not done," and is as anti-social as robbery with violence. For some years now, I believe, the Service has been treating such behaviour with the utmost seriousness, and a pilot who is convicted by a court martial is lucky if he is merely reduced in rank and grounded for an extensive period. The idea, presumably, is not so much one of punishment, as of "making an example" and of giving all trainees the idea that idiotic flying is a no better form of behaviour than handing in a succession of known-to-be-rubber cheques.

It doesn't really much matter—except to the relatives and friends—how many private pilots succeed in putting what is left of themselves into mortuaries. One feels that it is their own affair if they care to take a chance on such an uncomfortable *dénouement*. But there are the people on the ground to be considered, and a high crash-rate among amateurs will do irreparable harm to the whole flying industry. The layman will certainly not be able to distinguish satisfactorily between one accident and another, and he can be forgiven if he tends to think that flying as a whole is nothing but a rash interference with the laws of gravity. If there must be accidents they must be of the almost-unavoidable type.

Instructional Psychology

The "making of examples" is probably as poor and as slow a way of reducing flying accidents as is the vicious punishment of criminals who often know no better. Since flying people are likely to be more intelligent than safe-crackers and bruisers, the psychologists should be able to show results once they have been able to dig their toes in. And my "psychologists" will not, of course, be a bunch of Freudian experts; they will be the instructors, the manufacturers, the experienced pilots, and any other section of the community likely to have some influence on contemporary flying people.

I insist that nearly every avoidable accident is caused by a sense of false security experienced particularly while flying in present-day aircraft. In these one is surrounded by an apparently solid structure, which is the only reality in a strange aerial world, and there is little or no sense of speed. The aircraft, in fact, sits "still" while a landscape unrolls itself below and while a needle points meaninglessly at "32" or some other figure on the air-speed indicator. Everything around has the old familiar appearance; if it were not for the peculiarly gluey solidity of the "outside," one feels even that a stroll on to the wing would be quite pleasant—the solidity being merely, so to speak, a peculiarity of conditions outside all flying machines.

Stuffed Clouds

The impression of standing still is even more marked when flying through cloud. Surrounded by a grey fog, the pilot keeps a lot of instrumental recordings properly lined up, and in a quite unreal way ponders on his likely position in relation to a landscape which is nothing more in his mind than a map. Once again the ridiculous speed figure is a subject only of academic calculations, and is not an actual velocity which, if the cloud happened to be "stuffed" with a piece of high ground, would reduce both him and his oh-so-solid conveyance to brutal and indescribable chaos amongst boulders and trees.

Time after time we may set off in the sort of weather in which one just shouldn't fly, until one day a lesson is learnt when there isn't room to turn, and when the speed, even with undercarriage and flaps down, is too high for map-reading in visibility of the thousand-yard order. Perhaps a pilot has a particular aerobatic trick—a roll at ground level or a complete aileron turn and recovery from a thousand feet. He is so busy that the earth doesn't look hard and real—it is merely the datum line of the trick.

Even the lazily swish-tailed approach, with the trees and houses quietly slipping by, can be too casual through constant habit, and the pleasant, floaty, viceless toy suddenly becomes a lethal mass of metal.

The question is: How are we to inculcate a suitable respect for dear Uncle Isaac (and his thirty-two feet per second per second) without giving everybody at the very start an anti-airship inhibition?

Flying is not essentially more dangerous than anything else in the way of fast transport. The dangers of plain gravity are counterbalanced by the roominess of the air. It may even be considered a good thing that the uncomfortable possibilities are not immediately obvious to the trainee—and only academically obvious to the veteran. In all walks of life one would take to one's bed in a concrete shelter if absolute safety was the only criterion of happiness—and one would die there of rheumatic fever.

All that is needed is a habit of thought slightly unlike the conventional one in the matter of relative courage, and essentially matter-of-fact where possible flying risks are being considered. With it there must be a solid, inlaid conviction that any unnecessary show of dexterity at low level, whether for one's own or anybody else's benefit, is a breach of good taste and a mere exhibitionist piece of line-shooting. Such a conviction should not be difficult to maintain; flying, in any case, has by now lost any of its original and superficial glamour. It has become merely a scientifically interesting development, and even the layman is now more impressed by the solution of supersonic problems, in practice and in the laboratory, than by any dazzlingly accurate demonstration of skill at ground level or by the stupendous achievement of Wing Commander Prune in "pressing on" to his base, by rule-of-thumb D.R., when any sane person would have turned back. The public will never hear of Prune's achievements—only of his failures.

Aviation cannot yet afford adverse publicity. It may be nearly forty years since the first heavier-than-air machine left the ground, but it is still on probation.

"INDICATOR."

AIRCRAFT CARRY THEIR OWN RUNWAY

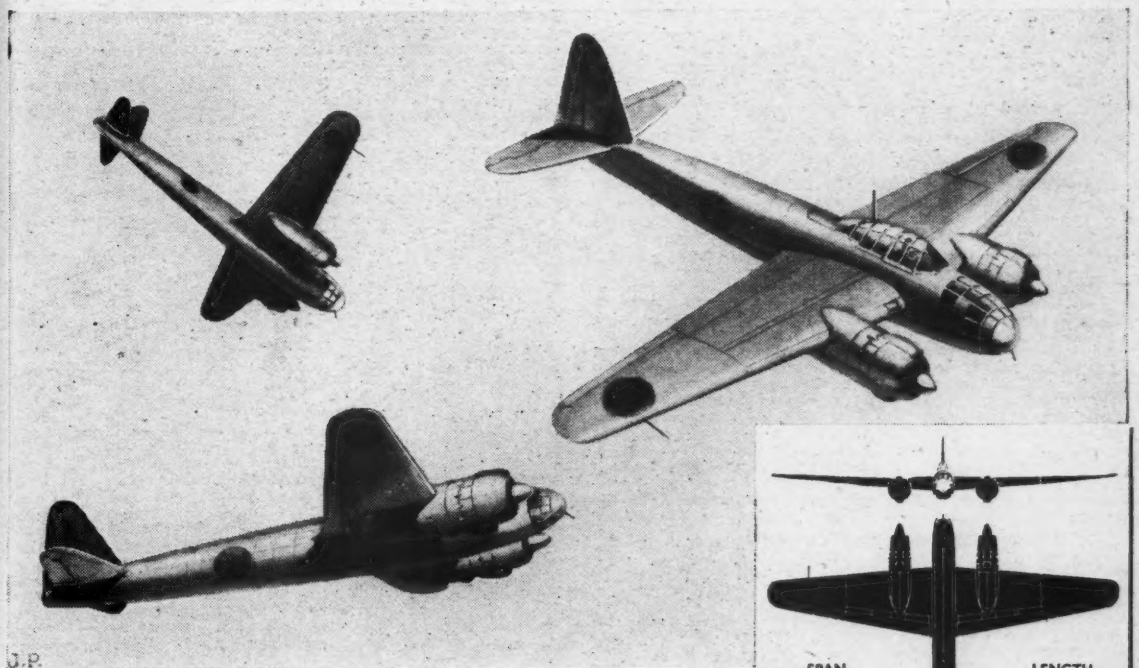
OF the many strange cargoes of war freight carried to the Continent by aircraft of R.A.F. Transport Command, a recent consignment to Belgium must rank as one of the strangest, for the aircraft were carrying their own landing strip.

Three months ago, the Transport Support Group of the Command set up a staging post between Brussels and the 21st Army Group Front. As the site needed a runway, tens of thousands of perforated steel planks—the standard "P.S.P." designed for emergency landing strips—were flown from Britain to an airfield 90 miles from the site, where good landing facilities existed, and thence conveyed by road.

With these, a runway 1,000 yd. long and 50 yd. wide, was laid down, so that operations could begin. To complete the runway, the Dakotas are now flying-in the additional P.S.P.s needed direct to the runway they are intended to augment. The standard P.S.P.s measure approximately 10ft. by 1ft. 4in., and weigh 62 lb.; a Dakota can carry easily a load of 80.

At the Belgian staging post in question, an adequate all-weather landing ground is of vital importance, for it has become one of the busiest airports in Europe. Since January 1st, when the first Close-Support Group aircraft touched down, scores of heavily laden Dakotas have been landing there every day—often close on 100 in a day—delivering a wide variety of high-priority war material for the Armies in the field.

Already some 40,000 Service personnel have passed through the staging post, inward or outward, and the daily freight arriving from the U.K. has frequently approached, and sometimes exceeded, the million pound mark. (*Picture on p.* 304.)



FRANCES II is the Pacific code-name of this recently introduced Navy torpedo-bomber which is powered by two Homare II double-row, 18-cyl. air-cooled radial engines produced by both Nakajima and Mitsubishi. The aircraft is assembled at the Yokosuka Navy Air Arsenal and its Japanese name is *Ginka*, meaning Milky Way. Notable for its clean lines, it carries a torpedo completely enclosed, and although often used as a bomber, was probably designed chiefly for torpedo attacks against shipping. Main armament is a 20 mm. cannon in the nose and another in the rear cockpit. Dive brakes are fitted and drop tanks may be carried.

The Civil Aviation Charter

Three Air Transport Corporations : Commonwealth, U.K. - Europe and South American : Judicial Tribunal to Safeguard the Interests of Users

THE long-awaited White Paper on the Government's policy for Civil Aviation was issued on March 13th (Cmd. 6605). The first part deals with the general principles applicable to British air transport and explains how the same basic considerations have been the guide as those of the White Paper issued last October, which dealt with international aviation.

The White Paper then goes on to outline the requisites of an air transport organisation:

In the view of His Majesty's Government, the following are the requisites of an efficient air transport organisation:—

(*a*) The Units must be large enough to operate economically but not so large or widespread as to preclude effective supervision along every route.

(*b*) Each Unit must have an efficient organisation covering every area served by its air lines to handle passengers, freight and mail, together with first-class knowledge and experience of transportation and facilities for full co-operation with other forms of transport wherever this can promote air travel.

(*c*) Provision must be made for the economical use and maintenance of aircraft.

(*d*) The most effective arrangements must be made for the training of air crews and ground staff and for their welfare.

(*e*) There must be close co-operation between the users and the manufacturers in deciding the types of aircraft to be used.

(*f*) The organisation should be capable of providing training for the crews of Commonwealth or foreign countries, and should also be able to supply these countries, where required, with technical and operational help.

Size of Units.—The Government are convinced that the policy of a single chosen instrument, whatever may have been its merits in the past, is unsuited to deal with the great expansion of the future. There must, therefore, be several air transport undertakings. A single entity, even if it could effectively include and use all the varied experience of aviation and transportation which it is necessary to bring in, would be too large and far-flung to fulfil the requirement of individual supervision of all the routes operated. Moreover, while as stated above it is clearly desirable to eliminate wasteful competition between British operators on the same route, it is none the less desirable both to avoid a sealed pattern of management and operation and to encourage different managements to try out their own ideas. This would in no way prevent the constant pooling of experience and the Government's plan is designed to secure this.

Civil Aviation as a Transport Problem.—Air transport can be greatly assisted and stimulated by co-operation with other systems of transport. To the solution of the problems which air transport poses British enterprises already engaged in other branches of the transport and travel business can, alike with the British Overseas Airways Corporation, bring a valuable contribution.. Their extensive organisation and connections both in the United Kingdom and overseas can with great economy of management be used to serve air transport equally with land and sea transport. Through their co-operation, the fullest use can be made of through-bookings, interavailability of tickets betweeen air and other forms of transport and the most convenient rail and sea connections on all parts of the air routes. It is therefore of the essence of the Government's plan that those interests concerned in transport by sea and by land should be brought into a real and effective partnership with the organisations which will be responsible for transport by air.

Carriage of Mails by Air.—The Government have a special interest in the carriage of mails by air. The Postmaster-General is considering, in consultation with the Minister for Civil Aviation and the undertakings which will operate the future British air services, the best and fullest use which can be made of those services for the carriage of air mail.

"The Most Efficient Organisation"

Routes to be operated by Separate Units.—Much consideration has been given to the number of air transport units which will be most effective at the present stage, and the routes which they should cover. The Government have decided that the most efficient organisation will be obtained by means of three main Air Transport Corporations which will be responsible for air services on the following routes:—

(1) The Commonwealth air routes together with the transatlantic service to the United States and the services to China and the Far East.

(2) European air routes and the internal services of the United Kingdom.

(3) The South American route.

It is obviously convenient that the same Corporation which will operate the air route from the United Kingdom to Canada, should also operate the Atlantic service to the United States. When conditions permit the inauguration of regular civil air services to China and other parts of the Far East, these will link naturally with the services to India and Australia, and it is desirable that they should be associated with the same Corporation.

The Government are satisfied that the arguments in favour of uniting internal services of the United Kingdom and services from the United Kingdom to Europe in a single Corporation are overwhelming. While the majority of Continental services will focus on London, connections will be required from the outset with other centres of population and industry in the United Kingdom; and, as air transport develops, services will run direct from some of these centres to the Continent. The same type of aircraft will be equally suitable for many of the European and internal services; and the economical use of such aircraft will be greatly increased if they can be drawn from a pool available for European and internal services in accordance with the fluctuating seasonal and other traffic demands on individual routes.

The trunk route from the United Kingdom to South America presents a new field for British civil aviation. It is one which our long and close relations with the States of that Continent make it essential that we should enter.

B.O.A.C. and Shipping Lines

Commonwealth Routes (including the Atlantic).—The Commonwealth and Atlantic routes, together with the ultimate extensions to China and the Far East, will be assigned to the British Overseas Airways Corporation. This Corporation and their predecessor, Imperial Airways, have been responsible for the development and operation of these routes in the past. They are in close relations with the corresponding operators of other Commonwealth countries. They are therefore clearly the appropriate instrument for the operation and further development of these routes. On many of the routes, however, a valuable contribution can be made by British Shipping Lines with their well-established organisation and local connections, and their experience of the special transport requirements of particular areas served. It is therefore proposed that these Shipping Lines shall be afforded the opportunity of becoming associated with B.O.A.C. in the operation of those routes to which they can make a useful contribution; an association which is welcomed alike by B.O.A.C. and the Shipping Lines. It will probably be convenient, in any case, for B.O.A.C. to operate certain of these routes through subsidiary companies; and as the interest and organisation of the different Shipping Lines is confined to particular routes, such a structure will clearly be desirable for those services in which British Shipping Lines participate. In any subsidiary companies the predominant financial and managerial interest will normally be held by B.O.A.C.; but the Shipping Lines will, at their own risk, take a share in the capital, and their transport experience and commercial acumen will be represented on the Boards. It is the determination of all the Shipping Lines which have expressed a desire to participate, as it is of His Majesty's Government, that the air routes with which they are to be associated shall be fully and successfully developed.

European and Internal Routes.—An agreed schedule of European and Internal United Kingdom routes will be assigned to a new company in which the participants will be the Railway Companies, the Short Sea Shipping Lines, Travel Agencies and B.O.A.C. and such other pre-war operators as desire to participate. In the first four groups is concentrated a great wealth of British knowledge and experience of aviation, transport and travel problems. In addition to their knowledge of United Kingdom and European traffic needs and their extensive organisation here and on the Continent, the Railways and their associated air companies have, in the past, successfully operated the great majority of the internal air services of the United Kingdom. The Short Sea Shipping Lines operate and have built up a valuable organisation and goodwill in connection with sea routes to Europe; some of them have also been associated with the operation of air lines in the past. The Travel Agencies combine a peculiar knowledge of the needs of the travelling and touring public with a wide organisation in this country and throughout the Continent. All the proposed participants are agreed on the importance of B.O.A.C. having its share in this Corporation. It will bring to it all its knowledge of aviation and its experience of the Continental air routes which its predecessors operated before the war.

Although the great majority of European and internal air services were previously operated by B.O.A.C., the Railway Companies or the Short Sea Shipping Lines, there was a small number of independent British operators who ran air lines before the war. All but one of these have been compelled to cease operating during the war, but the Government considered it fair to afford them an opportunity of taking up shares in the new company on the same terms as the other participants. In certain cases these operators have acquired a knowledge and experience of particular local internal routes to be included in the agreed schedule, upon which it may be in the public interest to draw. Where the Government is satisfied that this is desirable, the possibility of forming companies subsidiary to the main Corporation to operate these routes will

not be excluded. In such a case the pre-war operator will be afforded an opportunity of participating in the capital of the subsidiary company instead of or in addition to taking up shares in the new Corporation.

As stated previously, it is an essential part of the Government's plan that the new Corporation shall be responsible for all the British air services on the scheduled routes. Its right to run on these routes within the United Kingdom will be exclusive. Its services to Europe will be run in parallel or, it is hoped, in some cases in conjunction with the services of other European countries to the United Kingdom. These exclusive rights are clearly necessary to give economical operation and the running of a maximum number of air services. The plan will, therefore, provide for the Corporation to run some services, both in the United Kingdom and in Europe, which will initially be run at a loss and some of which may never show a profit. Services of this kind are necessary in the public interest and a comprehensive schedule of services will be settled which will serve the public interest as well as fulfilling purely commercial traffic needs.

THE CIVIL AVIATION CHARTER (CONTINUED)

By bringing into the Corporation those interests which are concerned with land and sea travel in the United Kingdom and to Europe, arrangements will be made for interavailability of tickets for the different forms of travel on all stages of the routes, for the use of the existing offices and agencies of the various participants both at home and abroad, and for the most convenient adjustment of times and frequencies of services in the interest of air travellers to facilitate through connections with other forms of transport.

The European and internal air routes are likely to be more lucrative than some of the Commonwealth routes which are to be assigned to B.O.A.C as the direct operating Corporation. The Government therefore think it right that the financial interest of B.O.A.C. in the new Corporation which will operate the European and internal air routes should be assessed in the light of this consideration as well as of the technical contribution which it can make to the new Corporation. While it is not proposed that B.O.A.C. should have a majority holding in the new Corporation, it is intended that its interest should be substantial.

South American Route.—The South American route will be assigned to a new company in which the majority participants will be those British Shipping Lines operating to South America who have associated together for this purpose as British Latin American Airlines, Limited. Here again it is proposed that B.O.A.C. should participate in the capital and management of the new Corporation, but its share in the capital will be smaller than that which it will receive in the Corporation responsible for the European and internal services. The British Shipping Lines which have for so many years carried a large proportion of the passengers and trade between Europe and South America and have their wide connections and organisation and their goodwill in the areas to be served by the new air route are, in the view of His Majesty's Government, in the best position to make the service a success. They have expressed their willingness to risk their own capital in operating the route without subsidy.

Transfer of Shares in the Air Transport Corporations.—The transport and travel organisations which have been invited by the Government to participate in the new plan have been selected by reason of the positive contribution which they can make in skill and experience to the new Corporations. That they are prepared to invest their own money without any Government guarantee is an indication of their belief in the future of civil air transport and an earnest of their intention to operate efficiently; but they have not been invited merely as investors. They will take a permanent stake in the enterprise; and the Government has accordingly laid it down that there shall be no transfer of the shares in the capital of the new companies which are allotted to the participants. This will apply not only to the two new main air transport Corporations, but also to the subsidiary companies which may be formed by B.O.A.C. to operate specific Commonwealth or Atlantic routes in which Shipping Lines may participate, and to any other subsidiary companies which may be formed by the other main air transport Corporations to operate particular services, such as those to the Channel Islands or the Isle of Man, where constitutional or other considerations make the formation of subsidiary companies desirable.

No Vested Interests

Payment for Goodwill.—His Majesty's Government do not regard anyone as having a vested interest in the air. Although the new air transport Corporations will be entitled to acquire at a fair valuation from existing air line operators any physical assets which are needed for the new services, the Government do not feel they would be justified in approving an allowance or issue of shares to participants in respect of goodwill or "development expenses" previously incurred. The whole of the capital of the new Corporations and their subsidiaries will thus be represented either by physical assets acquired or cash subscribed.

Overhaul of Aircraft.—In order to ensure the maximum of efficiency and economy, the three air transport Corporations will join in the creation and management of a combined organisation for the overhaul of aircraft.

Training of Air Crews and Ground Staff.—The highest standards of skill and reliability must be achieved for air crews and ground staff. For this purpose the three Corporations will maintain a combined training establishment at which their flying and technical staffs will be trained, and at which refresher courses will be available.

Recruitment of Staff.—The constituent elements of the three Corporations have expressed their keen desire that every possible opportunity shall be given to officers and men of the Royal Air Force to take service with the Corporations. Close relations will be maintained with the Air Council, through the Minister for Civil Aviation, in order to give full effect to this intention. It will, however, be appreciated that openings for employment in civil air transport will not be large compared with the wartime strength of the Royal Air Force.

Welfare of Staff.—His Majesty's Government will also make it a condition that the terms of service of these Corporations shall be those of a "model employer"; and in particular that special provision shall be made for pilots and other members of air crews in the event of death or disablement while engaged on flying duties, and for the granting of superannuation allowances to those classes for whom suitably paid ground employment cannot be provided when they are past flying age. The participants in the Corporations have expressed their ready assent to this condition. A scheme of this kind, which was settled in agreement with the appropriate employees' Unions, is already in operation in the case of B.O.A.C.

Relation of Minister for Civil Aviation to the Air Transport Corporations.—The appointment of members of the British Overseas Airways Corporation will be vested in the Minister for Civil Aviation; and he will also approve the appointment of the representatives of B.O.A.C on the Boards of the other two main operating companies The appointments of Directors upon the Boards of the other two main operating companies will be subject to approval by the Minister, as will the representatives of the Shipping Lines upon the Boards of the subsidiary companies of B.O.A.C. The approval of the Minister will also be required to the Memorandum and Articles of Association of all the companies, both main and subsidiary, which play a part in the scheme.

Cardinal Principles

Once the Corporations and subsidiary companies have been established and the members of their Boards appointed or approved by the Minister, as the case may be, it is a cardinal principle of the plan that the Corporations and the companies should be responsible for the operation and management of the air services under their control. While management must vest in the Corporations and companies, the Minister must have a general control over broad aviation policy. Thus all companies must conform to the policy laid down by International Convention or by bilateral or multilateral agreements entered into with other States by His Majesty's Government. Further, it is part of the plan that the Corporations shall operate, either directly or through their approved subsidiaries, all the air routes which are assigned to them. As stated above, an agreed schedule of routes so assigned to each of the Corporation will be settled. These routes the Corporations will undertake to operate They will not have the power to cease operation on any scheduled route without the consent of the Minister; but such consent will not be unreasonably withheld if events should prove that one or other of the agreed routes is neither commercially practicable nor required for the public interest.

The general policy of His Majesty's Government is that both internal and external air services should operate as far as possible without subsidy.

Internal Services.—So far as internal services in the United Kingdom are concerned the participants in the Corporation to which these routes will be assigned—and who are investing their own money therein—are willing to run without subsidy the agreed schedule of routes which will include, as well as the remunerative services, those routes which the Government regard as desirable in the public interest, although some of them, if they were dealt with in isolation, could not be run at a profit.

International Services.—In the international field the Government have already declared that it is a cardinal aim of their policy to reduce wasteful competitive practices and, in particular, to control subsidies with the object of ultimately eliminating them altogether. To this end, they proposed in the White Paper on International Air Transport (Cmd. 6561), and later expounded at Chicago, their considered plan for avoiding uneconomic competition in international air services, by maintaining a broad equilibrium between transport capacity and traffic offering a fair division of services between the national air lines engaged on international routes, and an agreement as to freight and passenger charges. His Majesty's Government had hoped to secure this by multilateral convention. This did not prove to be possible, but the broad principles laid down in the White Paper on International Air Transport remain the policy of His Majesty's Government. In any reciprocal arrangements which they make with foreign countries, the Government will stipulate for the reasonable application of these principles. In this way it is hoped that wasteful competition and subsidies may be largely eliminated upon the international routes in which Great Britain is interested. It is the intention that the agreed schedule of services on the European routes and the Latin American service should be operated without subsidy; provided always that services which the Government regard as essential to maintain are not faced with highly subsidised competition.

Commonwealth Services.—In the past the operation of certain of the Commonwealth routes has required a subsidy. These routes are so essential in the interests of Commonwealth communications that His Majesty's Government will be prepared to afford the necessary financial help to enable B.O.A.C. to operate them.

New Routes.—It is intended that the agreed schedule of routes to

THE CIVIL AVIATION CHARTER

be initially assigned to the three Corporations shall include all those upon which, in the view of His Majesty's Government, it is essential that United Kingdom Air Lines should be ready to operate as soon as war conditions permit and the necessary aircraft are available. In the future as air traffic develops, the need for new routes will emerge. It is not intended to make any present commitment as to the right to operate new routes. The Government consider that any new routes should be left open to whatever operator—whether one of the main Corporations or some entirely new operator—can establish that he is best fitted to run them.

Power of the Government to require Corporations to operate new Routes.—The Government, however, may from time to time wish to have operated, either within the Commonwealth or outside it, a particular route which is not in the agreed schedule of services, and which is not the subject of any application to operate either by the Corporation or by a new operator. In such a case the Government would have power to require the appropriate Corporation to undertake services on that route; but if the Corporation satisfied the Government that such a service could not be run without loss, the Government must be prepared to give the Corporation such temporary financial assistance as may be reasonable.

In order to ensure that the interests of the users of air transport are adequately and continuously safeguarded, it is intended to confer upon an impartial Tribunal jurisdiction to consider complaints as to such matters as the absence of reasonable facilities, the granting of undue preference, and the reasonableness of rates and charges of United Kingdom air lines. Such Tribunal should have power to enforce compliance with its decisions. In the case of complaints relating to overseas services—which are necessarily regulated by inter-Governmental agreement—the decision of the Tribunal must be subject to confirmation by the Minister.

The Commonwealth routes will be operated in full co-operation with other countries of the British Commonwealth. These routes have already been discussed with other Commonwealth Governments and with the Colonial Office as representing the Colonial Empire. The Commonwealth Governments have expressed their desire that reciprocal services from their countries to the United Kingdom shall be operated in parallel with the United Kingdom services to their countries. In order to make this parallel system effective and economical, arrangements are being made as regards facilities at the terminals and along the routes. Provision will also be made for an equitable division of revenue and expenditure where it is agreed that a pooling arrangement is advantageous. Arrangements for parallel operation will not, of course, exclude—they should, on the contrary, facilitate—the ultimate conversion of parallel operation into joint operation whenever and wherever the Governments concerned agree that this has become desirable.

His Majesty's Government will welcome the closest co-operation between foreign air line operators running services to the United Kingdom and the Air Transport Corporations set up under the Government plan. Here, too, while parallel operation will probably prevail in the initial phase, the possibility of running joint services through subsidiary companies in which the foreign operator would participate, is one which in the view of His Majesty's Government may present great advantages.

It is hoped that the combined training establishment for air crews and ground staff which will be set up in the United Kingdom, and possibly the joint organisation for the overhaul of aircraft, may prove of use to other Commonwealth operators and to foreign operators who desire to avail themselves of the facilities offered by these organisations.

User/Producer Collaboration

Provision of Aircraft.

It is, of course, the intention of His Majesty's Government, as it is the desire of the Corporations, that the Corporations shall use British aircraft as soon as they can be made available. The Ministry of Aircraft Production in collaboration with the Brabazon Committee, has already placed orders for a number of civil types. In war, when resources are strained and Service demands are paramount, the Government must place the orders for aircraft for civil aviation, because they must control and allocate the priority and distribution of all calls upon the resources of the aircraft industry. But there must be the closest collaboration between the Department responsible for placing the orders, the user and the producer, so as to ensure that the user gets the type of aircraft that suits the services he is to operate, and that the producer can apply to the needs of the user the best and latest experience in technical development and in the ingenuity and initiative of design staffs. Air line operators, no less than Air Forces, must have their eyes always on the future and not on the past, save in so far as the experience of the past may point the way to future progress. Arrangements have already been made to bring the new Air Transport Corporations into close collaboration of this kind with the manufacturers of aircraft and the Government Departments concerned. As soon as circumstances permit the Corporations and their subsidiaries will be free to buy aircraft direct from the manufacturers.

In the meantime it is the intention of the Government that in the initial stages, where such a course is convenient, the Goverment shall lease the aircraft which they have ordered to the Air Transport Corporations. The Government will also be prepared, in appropriate cases, to consider leasing to other Commonwealth operators and to foreign operators.

In framing their air transport policy, the Government have sought to apply to the development and expansion of our own air services those principles of ordered progress which they have advocated in the international sphere. They are planning to bring into operation as rapidly as the exigencies of war permit a complete network of Commonwealth services in full co-operation with other Commonwealth Governments. They are bringing into partnership, on practical business lines, those elements which, by reason of their experience and organisation, can contribute to the full and rapid development of British air transport. In this way the Government believe that they can best "meet the needs of the peoples of the world for safe, regular, efficient and economical air transport," and enable British civil aviation, which has had to be subordinated to the supreme war effort, to take its rightful place on the airways of the world.

Lords Debate the White Paper

Widespread Approval and Some Criticisms

THE Government's White Paper on British Air Transport was discussed in the House of Lords on March 15th. VISCOUNT ROTHERMERE opened the debate and paid a tribute to Lord Swinton for the speed with which he has set about his allotted tasks, of which there were three: the international, the national, and the question of aircraft. He asked Lord Swinton to calm the anxiety felt by many as to the position in regard to transport aircraft, the date on which it was hoped they might be in service.

Turning to the main policy set out in the White Paper, Viscount Rothermere welcomed the breaking-away from the single "chosen instrument" policy. "Undoubtedly," he said, "a single chosen instrument is bound, sooner or later, to inherit the vices of complacency, and sooner or later it will be found that initiative is lacking." He thought three chosen instruments were better than one, but he found it difficult to know whether there were three. They seemed rather like the doctrine of the Trinity—three in one and one in three. Although he would like to see comparative competition, he did not see how that could develop between three organisations so mixed up as these were. He did not quite understand why it was necessary that B.O.A.C. should have its finger in the pie of both the other chosen instruments instead of being allowed to maintain itself on its own so that it could be judged according to its merits. He thought tremendous powers were being given to the Minister of Civil Aviation. He had great confidence in the present Minister, but changes would be bound to be made later, and it was essential to understand the full implications of these powers. He disagreed with the monopoly on internal air routes and thought there ought to be at least two internal services.

LORD RENNELL thought the grouping of internal and European services a little strange in that the internal are to be exclusive while the European will be competitive with foreign air lines. As to the three Corporations, he thought there would not be much difference in managements. His third point dealt with the scheduled services. If these initially covered virtually the whole field of operation there would be little left for new corporations.

THE MARQUESS OF LONDONDERRY welcomed the progress made: the separation of civil aviation from the Air Ministry, the appointment of a Minister, the abandonment of a single chosen instrument, the association of the railway and shipping interests, and a *plan*. He thought as much had been done as could be done in the short time. He pressed for information about the future licensing authority, and deprecated the decision to grant no compensation to private companies.

VISCOUNT KNOLLYS and LORD KENNETT, as might have been expected, spoke in favour of the White Paper, both stressing the good intentions which B.O.A.C. and the railways have.

VISCOUNT TRENCHARD supported the White Paper wholeheartedly, but made the suggestion that when legislation is prepared it might be embodied in a charter, like that of the B.B.C., which could be reviewed once in five or once in ten years.

LORD BRABAZON OF TARA said the White Paper dulled the edge of controversy by satisfying everyone. He thought, however, it looked as if the paying routes were to be handed over to the railways. But as to the plan in general, he thought we were "going places."

VISCOUNT SWINTON very ably defended the White Paper and cleared up many of the points that seemed in doubt. He stressed the spirit of goodwill he had found in the shipping and railway interests. Of the new aircraft he said: "The prototypes, as soon as they are finished with as prototypes, will be used for training the crews. The Tudor I ought to begin with a trickle of production in June of this year—perhaps we may get one in May. The numbers are not very large. Tudor II ought to begin in November of this year" . . . "we ought to be getting a flow of production of that type early next year. The V.C.1 begins at the beginning of next year, but it will be slow at first and will get into its stride about the middle of next year."

They Voted for Speed

Comfort Takes a Back Seat at R.Ae.S. Debate

NO visitor to a Royal Aeronautical Society debate, such as the one held at Storey's Gate last week, could fail to be struck by one very obvious fact: that everybody concerned is most anxious not to be pinned down to any definite belief or point of view.

In introducing the subject of last week's debate—"That speed in air transport is more important than comfort"—the president and chairman, Sir Roy Fedden, made it quite clear that the speakers, for and against, did not necessarily hold the point of view they happened to be supporting, and that when the vote was taken it must not be assumed that the result necessarily represented the official attitude of the Society. To put it briefly and bluntly, nothing really meant anything!

Now this is obviously a very sound precaution so far as the Society itself is concerned, but it certainly conveys the impression—to the impartial observer—of wavering uncertainty in the individual; a doctrine of the timid who want to sit on the fence so as to be in a position to come down on either side with equal facility. But be that as it may the debate in question certainly had its entertaining moments, and one participant at least was known to be a firm believer in the view he was backing, namely Mr. L. A. Rumbold, who, with Mr. W. A. Davenport, supported the cause of "comfort" so ably launched by Prof. G. T. Hill. Indeed, Mr. Rumbold was referred to by Major Mayo as "the arch apostle of ease for V.I.P.'s."

The final vote proved to be overwhelmingly in favour of the prime importance of speed, in the convincing ratio of 71 to 29.

It must be admitted that some of the speakers were at a disadvantage in not having time to develop their arguments as they had planned them. This is by no means an uncommon handicap at debates and is generally caused, as in this case, by the opening speakers being allowed to overshoot their time allowances. It meant, too, that a number of those present who had expressed a desire to speak were unable to do so, for Sir Roy is too good a chairman to allow a debate to drag on beyond its allotted span. And though he had allowed the chief speakers a little extra rope at the start, he brought the meeting skilfully to a close "spot on" the appointed time.

Legs and Leg Room

MAJOR R. H. MAYO opened the case for "Speed first" and rather sought to spike the guns of the opposition by at once agreeing that both speed and comfort were essential in air transport. There was no suggestion, he said, that any of the essential requirements for comfort should be sacrificed. Indeed he himself had always demanded a high standard of comfort for both passengers and crew. But the standard required was closely related to the particular service under consideration; it depended, for example, on the duration of the journey being undertaken. The degree of comfort provided was a matter of the space allotted to each passenger, the lighting, toilet accommodation, the provision of food when necessary and similar things. These meant so much weight, but weight only had a secondary effect upon speed. What had a primary effect upon speed was the cubic space of the fuselage, and when you exceeded, for any particular class of service, the minimum standard of comfort that had to be met, you then passed from mere comfort into the realm of luxury. Where long flights were concerned, too many concessions to luxury might so reduce the speed as to rob the aircraft of the desired range. Operating costs also had to be taken into consideration, and he submitted that a gain of 50 m.p.h. could reduce the operating cost by as much as ten per cent.

PROFESSOR HILL then opened the case for "Comfort first" and pointed out that physical and mental factors were involved in comfort. A sense of safety contributed largely to one's mental comfort, and, therefore, to one's enjoyment of a journey. Turning to a blackboard he drew a simple diagram in red and green. It consisted of a long, shallow rectangle in which the two colours were divided diagonally along its major dimension. The long green triangle represented comfort and the long red one, speed. Thus at one extreme it represented all speed and no comfort, and at the other all comfort and no speed, and the problem was to decide at what point between these two extremes the line should be drawn.

Touching upon the cost which comfort imposed in terms of speed, Prof. Hill advanced the theory that a ten per cent. increase in comfort would only involve a one per cent. loss in speed. "I don't claim that those figures are exact," he added, "I just put them up for somebody to shy at." Admittedly more comfort meant taking up more space whatever the form of transport. On the railway, the first class passenger's extra comfort came largely from greater leg and elbow room. "But," added Professor Hill amid laughter, "he doesn't expect to get there any sooner than the third-class passenger, for fairly obvious reasons."

Quick Reasonable Discomfort

Next came Mr. Peter Masefield to champion the cause of speed, and he had come armed with lantern slides. Some of these were imposing arrays of tabulated figures designed to prove that speed showed a better return than did comfort for the same sacrifice in payload. Others illustrated various examples of aerial luxury and included the dining saloon of the R101. Airships, the speaker pointed out, provided plenty of physical comfort (though he was not going to say anything about mental comfort), but they had died because they were too slow.

A point in favour of extra speed was that you got there sooner and so had less time in which to feel unsafe or uncomfortable, but speed was even more important because it was more economical and was more in demand. Built-in comfort might mean built-in headwinds; the old H.P. 42 was more comfortable than the DC-4, but it was superseded because it was too slow. A shorter duration for a given trip reduced the standard of comfort required, and Mr. Masefield compared the cubic capacity per person which it had been found was required for flights of various durations. The history of air development, he said, showed that speed and safety were both going up, but that comfort remained more or less static.

MR. W. A. DAVENPORT went in first wicket down for the comfort team, and said he could not agree that increased speed reduced the cost; on the contrary it sent it up out of all proportion. The added cost of comfort, however, could be retrieved by the increasing number of passengers it would attract by the feeling of well-being it engendered. He put in a strong plea for high-altitude flying in the interests of passenger comfort. It gave greater safety, too, with no increase in operating cost, and, excluding sound-proofing, only added three per cent. to the total weight of the aircraft. But Mr. Davenport gave a word of warning against the use of the terms "pressure cabin" and "pressurising" where passenger airliners were concerned. The terms suggested something vaguely uncomfortable to the average layman, and he preferred to speak of it as "atmosphere control." As a final argument in favour of giving a priority to comfort, he said that the majority of air travellers would be middle-aged people because, generally speaking, the young ones would not be able to afford it.

A point worth mentioning at this stage is that although the newspapers on the day of this debate were full of the

THEY VOTED FOR SPEED

White Paper on the post-war civil aviation set-up, nobody had so far made any reference to the subject. This may well have been due to the fact that a previous R.Ae.S. debate with a political angle had brought certain repercussions in its train. In fact, the chairman made passing reference to this in his opening remarks, and had mentioned that the present debate was commendably free from any political implications.

To MR. F. G. MILES, however, fell the distinction of now getting in a sly dig at the Government's announced policy; it was only an oblique reference, but it was the only one of the whole evening. It came at the close of his speech in support of speed when he said that, until to-day, we in Britain had missed the importance of speed in air transport. "And now," he observed, "it seems there is to be no competition, and so the passenger, who might have been allowed to decide which he prefers, will have no chance to show us which he wants most—speed, comfort, or cheapness. We shall have to use our own judgment and decide for him. And if we judge wrongly, as we may, then God help this country!"

The chief function of an aircraft, Mr. Miles said in presenting his contribution, was to get people from one place to another as quickly as possible. Of the five main factors involved in so doing he would place safety first, followed by regularity, speed, cost and comfort, in that order. Comfort and cost, he added, were probably interchangeable, but the first three were not. However, speed meant safety, and safety meant comfort. On an Atlantic crossing anything less than 300 m.p.h. was dangerous unless safety was to be achieved at the expense of regularity.

Waiting on Wind

Describing a trip he and Mrs. Miles had made to America in a Boeing Clipper, he related how, having got as far as Ireland without any trouble, they had to wait some time for a strong headwind to drop, and when they did start they had to turn back after a few hours because the speed of the Clipper—a most comfortable aircraft—was such that their fuel reserve would have been dangerously low before they got to the other side.

"Their pilots," he added, "are the finest in the world; there's no mistake about that!" but it was not quite clear if he meant Clipper pilots or American pilots in general.

"So far," he said, amid laughter, "we had averaged 1¾ m.p.h. from the time we left my office in London."

Next came the "arch apostle of ease for V.I.P.s," Mr. Rumbold, who confessed he was decidedly nonplussed at having to scrap his notes because of the shortage of time, but he nevertheless put up a good show if only, to quote his own modest expression, as an entertainer. We already had speed far above other means of transport, he pointed out, but we did not yet enjoy as much comfort as we might have. Speed meant increased fuel consumption and reduced payload, whereas comfort meant satisfied customers and queues at the booking office. To-day, technical improvements provided comfort without undue extra weight. It was when describing, in racy fashion, his own experiences of a ride in a very fast, but decidedly uncomfortable Service type, that Mr. Rumbold qualified as an entertainer. "They had to lift me out of it when we landed," he said, "and I lay on the ground for 20 minutes before I could recover." Certainly a most compelling argument in favour of comfort as opposed to speed!

After Capt. Cripps had stressed the safety aspect in speed, especially in westbound Atlantic crossings when head winds of over 90 knots could be encountered, and Mr. W. E. W. Petter had claimed that only when comfort became luxury could the speed merchants make a case, the argument for speed was as good as cinched by Air Vice-Marshal D. C. T. Bennett, who reminded his audience that Imperial Airways had provided the best comfort in the world but had been slow. He remembered the disgruntled passengers lolling in their comfortable seats until they saw they were overtaking an even slower Italian airliner, upon which they crowded to the windows and exhibited signs of great delight. But K.L.M. provided a much faster service and, quite frankly, he had never seen such ill-feeling as had been exhibited against Imperial Airways for their slowness compared with the Dutch line's much faster aircraft. (K.L.M. used American aircraft.)

Aircraft versus Aircraft

It was no use making comparisons with the speeds of other means of transport; we must compare the speed of Britain's aircraft with the aircraft of other countries.

Another good point was made by Group Capt. B. E. Becker, who said that comfort was a means of avoiding loss of time, as witness what had happened to Mr. Rumbold. Discomfort produced physical and mental fatigue, which took time to get over; passengers must arrive in a fit state to conduct their business or enjoy the pleasures they came to seek.

Group Capt. G. W. Williamson, who summed up in favour of the "speed merchants," pointed out that irrefutable evidence had been given that speed spelt safety on a long trip, and mentioned that a recent Gallup poll in the U.S. had shown 68 per cent. in favour of more speed. Speed did mean economy because of the fewer flying hours on a given trip, and finally, nobody wanted slow aircraft, least of all the manufacturer, who would be unable to sell them outside Great Britain.

For the "comfort first" side, Col. W. A. Bristow said that the debate had really concluded before it was properly started, because Major Mayo had admitted that speed should not be obtained at the cost of comfort, and nobody had contradicted him. The graphs and figures shown by Mr. Masefield did not affect the issue, which would be settled by the public as it had been in surface transport; and they were becoming more and more luxury-minded, as witness the *Queen Mary* and the *Normandie*. Of late years, also, comfort had been the main selling line with motor cars, though they also had improved performance. Comfort, in short, was not necessarily opposed to speed.

In closing the meeting after the vote had been taken, Sir Roy Fedden announced that the next debate would be held on April 16th.

FLEET AIR ARM IN AUSTRALIA

A ROYAL NAVY air station for the Fleet Air Arm has already been established at a remote place on the Australian coast, and Fleet Air Arm pilots have moved in, fresh from England, Scotland, Wales, Ireland, Canada and New Zealand.

Some of the airmen have flown from such well-known carriers as *Illustrious*, *Indomitable* and *Victorious*, while some took part in the sinking of the *Bismarck*.

The main base and some satellite strips are in rugged bush country and the men are enjoying the open-air life in tents. Lieut. Dixie Deans, of London, said everyone was settling in well. What pleased them most was the quantity of food served; they got as much meat in one day as they received in a week in Britain.

Life in the wilds, it seems, has its compensations.

T.C.A. DEVELOPMENT

TRANS-CANADA AIRLINES started a third daily transcontinental service between Montreal and Vancouver last month. By using Lockheed Lodestars on the transcontinental run, T.C.A. increased its passenger accommodation 100 per cent. Ten-passenger Lockheeds were previously used. Revision was also made on runs between Toronto and New York, Toronto-Detroit, Toronto-Ottawa-Montreal. T.C.A. is usihg an increasing number of repatriated R.C.A.F. personnel who have completed their tours overseas, on the various flights.

T.C.A. also reports that 54 persons have filed applications for seats on the first commercial trans-Atlantic services by the line after the war. The line now operates a thrice-weekly airmail and passenger service in converted Lancasters between Montreal and Scotland. It is also expected to start a direct service from Toronto to Chicago and return.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

WEIGHTY WAR PAINT

Importance of a Smooth Skin

WE feel we cannot pass the paragraph entitled "Weighty War Paint" on page 223 of March 1st issue without some comment. Possibly your American contemporary is misinformed, but we should not have thought it necessary to apply 628 lb. dry paint to camouflage a Martin Mars.

If its removal gave an improved surface aerodynamically, we can only assume that it was not a satisfactory painting system or had been applied badly, and, further, that the skin of this particular aircraft was unusually smooth.

Tests in this country indicate the need for careful levelling of seams, rivets, etc., to give maximum speed, but perhaps our American friends have found a new way of constructing a smooth exterior.

W. F. WILSON
(Manager Technical Development),
Cellon, Ltd.

IMPLICATIONS OF V2

Progress Towards Inter-planetary Flight

IN reply to the letters from Mr. Becker and Mr. Sykes, which appeared in *Flight*, February 1st, may I offer the following observations.

First, I must admit that for a mass ratio of 3.42 and an efflux velocity of 2.82 km/sec., the figure of 3.01 km/sec. is correct, and that this does materially affect the ultimate conclusions. Nevertheless, the implications still remain that the advent of V2 has shown solutions to many of the problems attendant upon the designing of a machine capable of escaping from the gravitational attraction of this planet.

Mr. Becker assumes 50 seconds for the burning time of the second rocket, stating that there was no explicit indication of my assumption. I contend, however, that my equations showed clearly that g-losses were not included at the second stage. In this connection it is interesting to note that if a suitable orbit is chosen, there need be no g-loss once the rocket has reached orbital velocity, and providing subsequent acceleration is then tangential to the earth.

I must disagree, too, with Mr. Becker's statement, in the penultimate paragraph of his letter, that complicated machinery would be necessary for the successful operation of the small rocket. Experiments have shown that jet velocities in the order of 2.1 km/sec. (thermal efficiency of 40 per cent.) can be obtained with nothing more complicated than a high-pressure nitrogen tank used in conjunction with suitable reducing valves. Nevertheless, I must endorse your correspondent's view that the R of 22 is a practical impossibility for liquid-fuel rockets. May I add, at this point, a reminder that a slight improvement in jet velocity and/or mass ratio for the large rocket would considerably change these conclusions.

Mr. Sykes expresses doubts regarding the final velocity equations of Mr. Gatland and myself. The expression $V = v \log. R$ refers, of course, to a hypothetical rocket, isolated in space, beyond the influence of gravitational fields. Remembering that $R = Mo/M_t$, it is clear from the beginning of my letter (*Flight*, January 1st) that the equation must be corrected so as to allow for the effects of gravity. In the last sentence of the second paragraph of his letter (*Flight*, January 11th) Mr. Gatland states that he allows for gravitational loss in the 1 km/sec. which he deducts from his figures.

I cannot agree with Mr. Sykes' comments regarding thermal efficiency, and only wish that I could! His figures are apparently taken from the report by Joseph Stommer (*Flugwehr und Technik*, No. 8, August, 1941, pp. 191-198, "Development of Jet or Rocket Propulsion"), but it is debatable whether or not Oberth obtained the reported efflux velocity of 4.47 km./sec. with the loxy-hydrogen fuel and upon which the efficiency of 80 per cent. is based. Efflux velocities obtained by the *Verein für Raumschiffahrt E.V.* were only in the region of 2.0 km/sec., and Oberth's *Kegelduse* was rather a dismal failure, having a v of but 0.85 km/sec. Sänger did obtain much better results, but he employed a heavy Bosch fuel pump to give a feed pressure of about 2,200 lb./sq. in. (*Astronautics*, No. 34).

Mr. Sykes also does not mention the losses due to reduction of the thermic yield of the fuel with high temperatures, and those due to thermic dissociation. The latter, in the case of the oxy-hydrogen reaction may reduce the actual jet velocity to nearly half of the theoretical 5.2 km./sec. Dissociation losses can be reduced by increasing the chamber pressure and by injecting a surplus of hydrogen over the stoichcometric amount. In this connection, it would be interesting to know the blast chamber or fuel-feed pressure of the V2 motor.

The burning time of 147 sec. is, in my opinion, rather too long, and in the case of a lunar shot it would have to be considerably reduced. I placed about 45 sec. as a reasonably short burning period.

Although in the light of the more complete technical reports that have been published since the writing of the original letters by Mr. Gatland and myself, it appears that V2 itself, even if modified, could not be employed to transport a reasonable load to the moon, the implications still remain. The actual rocket that would be required would not be of a much greater order of magnitude; 20-30 tons being a reasonable quotation by Mr. Gatland in his letter (*Flight*, January 11th). The actual V2 fails rather badly in that the mass ratio is so very low and must be improved to at least 5 before the rocket could be successfully considered as a first step for a lunar experimental flight. Of much greater importance, however, is the obtaining of a more favourable efflux velocity. Would that Mr. Sykes' 3.576 km./sec. were true!

In conclusion, I must point out that if all useful factors are taken into consideration, such as high altitude of launching ground, rotation of the earth, partial cancellation of the terrestrial and lunar gravitational fields and the effects of the solar field, then it will be found that the views taken were not so incurably optimistic as implied by the final paragraph in Mr. Becker's letter.

E. BURGESS.

SAFETY FIRST

The Danger of "Over-Boffinisation"

I MUST accept Mr. Colin Richardson's gentle reproof in the matter of my familiarity with "Boffins"—though my small experience with some of the latest devices suggests that they are still not precise enough in their "story" to be depended upon in serious day-to-day operations with peacetime passengers. It is all very well, but the best of "Boffins" is liable to failure or misinterpretation, and the whole point of my "nagging" was that we simply cannot afford to have transport flying accidents. Even at the cost of regularity, airline safety must be as absolute as is practically possible. Meanwhile we should strive for 100 per cent. regularity—but not at the risk of disasters.

As for other means of transport, the very "Boffins" which will assist aircraft can be made to assist these equally as well so long as they are running along rails or are fully controlled. Even so, I agree that the air offers better chances of regular operation in bad weather than any other medium, and therein lies its big chance—though only when the distances are such that temporary starting and arriving delays can be suffered without complaint. And I most heartily agree with Mr. Richardson's suggestion that transport crews should be given ample rest time—part of which could be devoted to training on the ground. But in that suggestion he is again getting rather close to my "specialisation" idea.

Let us not be led blindly into the "Boffin-trap" which killed more passengers than we care to think of in the years immediately preceding the war. Admittedly "Boffins" were young then—but age produces complication rather than greater reliability.

Let me, in conclusion, give one brief example of what I call the "Boffin-trap." Before the war I was flying as an interested up-front passenger-cum-second pilot in a transport aircraft entering Hamburg in fairly bad conditions. I've forgotten the Q.D.M. of the approach in question, but between the outer and inner marker beacons on that day there was a complete "hole" in the signals. One moment we were approaching with a nice constant note in the earphones, and the next moment there was complete silence. It was only after two runs that we discovered that the beam was, so to speak, rejoined a little further on. Perhaps someone, by way of a Teutonic joke, had laid a length of corrugated iron on the ground. In any case, that V.H.F. approach line provided an unexpected hazard.

"INDICATOR."

ALLIED VISITOR : A B-29 has landed on a forward airstrip in Burma, where R.A.F. Thunderbolts are being serviced.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Appointment

THE Air Ministry announce the following appointment:—

Air Vice-Marshal G. H. MILLS, D.F.C., to be A.O.C., Balkan Air Force.

Air Vice-Marshal G. H. Mills has been Director of Policy (General) at the Air Ministry since September, 1943.

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations.

Bar to Distinguished Service Order

Act. Sqn. Ldr. H. B. HUNT, D.S.O., D.F.C., R.A.F.V.R., No. 177 Sqn.—Throughout three tours of operational duty, Sqn. Ldr. Hunt has displayed enthusiasm, courage and devotion to duty of the highest order. He has always volunteered for the most hazardous missions and the results he has achieved in attacking enemy lines of communication have been outstanding. His cheerful determination, excellent leadership and fine fighting spirit have set an inspiring example to all members of his squadron.

Distinguished Service Order

Act. Wing Cdr. M. T. JUDD, D.F.C., A.F.C., R.A.F.V.R.—This officer has taken part in many attacks against heavily defended targets and, owing to his brilliant work, excellent results have been obtained. Wing Cdr. Judd has a distinguished record of operational flying. He is an outstanding pilot whose fine fighting spirit has been an example to all his colleagues. He has destroyed one enemy aircraft.

Act. Wing Cdr. J. WOODROFFE, D.F.C., R.A.F.O. —Since being awarded a Bar to the D.F.C., this officer has completed a number of dangerous and difficult sorties. On several occasions his aircraft has been hit and damaged by anti-aircraft fire, but Wing Cdr. Woodroffe has completed his task successfully. Throughout an outstanding operational career this officer has displayed the highest qualities of leadership and great bravery. His example, both in the air and on the ground, has been most inspiring.

Act. Sqn. Ldr. W. A. OIMSTED, D.F.C., R.C.A.F., No. 442 (R.C.A.F.) Sqn.—This officer has led the squadron on very many sorties, during which great loss has been inflicted on the enemy. Much of the success achieved can be attributed to this officer's brilliant leadership, outstanding skill and courage, which have inspired all under his command. Sqn. Ldr. Oimsted himself has been responsible for putting out of action a large number of mechanical vehicles, numerous locomotives and coaches and much other equipment; he has also destroyed four enemy aircraft. His determination to harass the enemy on every possible occasion has been worthy of the highest praise.

Act. Sqn. Ldr. E. R. BENSON, D.F.C., R.A.F.V.R., No. 107 Sqn.—Sqn. Ldr. Benson has completed a third tour of operational duty, during which he has participated in a large number of attacks on dangerous targets. Throughout he has displayed a high standard of navigational ability, and his excellent work has proved an important factor in the success obtained. He is an ideal crew member, whose great keenness and exemplary conduct in the face of the enemy have set an example of a high order.

Bar to Distinguished Flying Cross

Act. Wing Cdr. R. I. K. EDWARDS, D.F.C., A.F.C., R.A.F.—This officer was awarded the D.F.C. for services in the Middle East before the outbreak of the present war. He has taken part in many operational sorties and has proved skilful and courageous when attacking heavily defended targets. Wing Cdr. Edwards has set a splendid example by his fine fighting spirit and great devotion to duty.

Act. Sqn. Ldr. C. A. H. BECK, D.F.C., R.A.F.V.R., No. 98 Sqn.—An outstanding flight commander, Sqn. Ldr. Beck has led his flight on many operational sorties, often in the face of heavy odds. Both in the air and on the ground he has always displayed enthusiasm, determination and gallantry of a high order.

Act. Sqn. Ldr. A. E. S. VINCENT, D.F.C., R.A.F.V.R., No. 181 Sqn.—Sqn. Ldr. Vincent has taken part in a large number of attacks against enemy supply routes, mechanical transport, barges and tanks. Since the award of the D.F.C. he has played a major part in the successes achieved by his squadron.

Sqn. Ldr. G. J. GRAY, D.F.C., R.A.F.V.R., No. 182 Sqn.—Sqn. Ldr. Gray was detailed to lead a formation of aircraft in an attack on a large concentration of enemy transport and tanks near the German front line. In spite of intense fire from the enemy's ground defences, the operation was completed successfully. Throughout the flight, Sqn. Ldr. Gray displayed a high degree of courage and resolution. His aircraft was hit in the first run in. Despite this, he pressed home his attacks again and again and contributed materially to the good results obtained. Since being awarded the D.F.C. this officer has completed very many varied sorties.

Act. Sqn. Ldr. J. M. PILCHER, D.F.C., R.A.A.F., No. 455 (R.A.A.F.) Sqn.—Within recent months Sqn. Ldr. Pilcher has participated in a number of attacks on enemy shipping and has displayed the greatest skill and daring in pressing home his attacks. On two occasions in December, 1944, he led the squadron in attacks on shipping in enemy waters with good results. He is an outstanding pilot, whose great courage and devotion to duty have impressed all.

Act. Flt. Lt. D. K. NELSON, D.F.C., R.A.F.V.R., No. 7 Sqn.—This officer has completed two tours of operations during which he has participated in attacks against a variety of targets. By his outstanding skill, cheerful co-operation and extreme devotion to duty he has played a large part in the many successes achieved by his crew.

Act. Flt. Lt. B. E. PATRICK, D.F.C., R.A.F.V.R., No. 109 Sqn.—This officer has completed numerous operational sorties since the award of the D.F.C. He has displayed outstanding keenness for operational flying and has achieved considerable success. He has continued to display courage and devotion to duty of a high order which, combined with his unfailing determination to complete his allotted task, has set an excellent example to all pilots.

Act. Flt. Lt. E. A. PEARMAIN, D.F.C., R.A.F.V.R., No. 7 Sqn.—Since being awarded the D.F.C. as captain of aircraft this officer has taken part in many operational sorties against heavily defended targets. He has always displayed the utmost determination in pressing home his attacks and his undaunted courage and steadfast devotion to duty in the face of danger have inspired his crew with confidence.

Act. Flt. Lt. B. S. SWIFT, D.F.C., R.A.F.V.R., No. 109 Sqn.—Flt. Lt. Swift has always shown himself to be a skilful and resourceful navigator. Since the award of the D.F.C. he has participated in many further attacks against major targets in the Ruhr Valley. He has continued to maintain an excellent standard of courage and devotion to duty which merits high praise.

Act. Flt. Lt. N. W. WADE, D.F.C., R.A.F.V.R., No. 109 Sqn.—Since the award of the D.F.C. this officer has participated in many more operational sorties which have included attacks against heavily defended and important targets in Germany and enemy occupied territory. Throughout his two tours of operations, Flt. Lt. Wade has always displayed a fine fighting spirit, outstanding navigational ability and great devotion to duty which have been worthy of high praise.

F/O. A. G. BRUTON, D.F.C., R.A.F.V.R., No. 138 Sqn.—Since the award of the D.F.C. this officer has completed many further successful sorties. Throughout his three tours of operations, F/O. Bruton has displayed outstanding skill, cheerful courage and unfailing devotion to duty both in the air and on the ground which have won the admiration of all his squadron.

F/O. J. HARBOTTLE, D.F.C., R.A.F.V.R., No. 128 Sqn.—F/O. Harbottle has a long record of successful operations. Since the award of the D.F.C. he has participated in numerous further sorties which have included many attacks against German targets. He has consistently set an outstanding example of navigational skill, determination and devotion to duty.

F/O. W. C. L. MCKAY, D.F.C., R.A.F.V.R., No

158 Sqn.—Through his second operational tour this officer has continued to show great courage, keenness and determination. F/O. McKay has always pressed home his attacks despite all opposition and his fearlessness and fortitude in the face of the enemy, together with his unfailing devotion to duty, merit high praise.

F/O. T. T. THOMAS, D.F.C., R.A.F.V.R., No. 109 Sqn.—Since the award of the D.F.C. this officer has completed many further operational sorties against some of the most heavily defended targets in Germany and enemy occupied territory. He has always displayed skilful pilotage, determination and devotion to duty which, combined with his fine fighting spirit and tenacity, have set an outstanding example to all pilots.

Act. Flt. Lt. A. L. JOHNSON, D.F.C., R.A.A.F., No. 635 Sqn.—Flt. Lt. Johnson has completed a second tour of operations since the award of the D.F.C. As pilot and captain of aircraft he has successfully participated in many attacks against the most heavily defended targets, including Berlin. Throughout all his operations this officer has displayed a fine fighting spirit and determination which have been most praiseworthy. The high standard of efficiency attained by his crew is largely due to his fine leadership and attention to detail.

Act. Wing Cdr. A. J. LEWINGTON, D.F.C., R.C.A.F., No. 433 (R.C.A.F.) Sqn.—This officer has completed two tours of operational duty. He is a keen and efficient flight commander and under his fine leadership the squadron has attained a high standard of operational efficiency.

Act. Sqn. Ldr. D. J. MCQUOID, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—Throughout two tours of operations Sqn. Ldr. McQuoid has displayed magnificent leadership, courage and devotion to duty which have been worthy of the highest praise. He has participated in many important and hazardous missions and has always pressed home his attacks despite all difficulties he has encountered. Since the award of the D.F.C. he has maintained a high standard of skilful pilotage and cool determination.

Act. Sqn. Ldr. J. A. MORRIS, D.F.C., R.C.A.F., No. 434 (R.C.A.F.) Sqn.—Sqn. Ldr. Morris has proved himself to be a courageous captain of aircraft and an outstanding flight commander. Throughout his second tour of operations he has completed many further sorties and has always continued to press home his attacks with a determination and devotion which have set a magnificent example to all.

Flt. Lt. R. C. MOYER, D.F.C., R.C.A.F., No. 408 (R.C.A.F.) Sqn.—Flt. Lt. Moyer has shown himself to be a brilliant navigator. On two of his operational sorties his navigational equipment was rendered unserviceable. On both occasions it was due to his outstanding skill that his aircraft and crew were saved. He has participated in many operations against major targets in Germany. Throughout his present tour he has acted as navigation leader in which capacity he has set a high example of leadership and crew co-operation. His cheerful courage and unfailing devotion to duty have won the admiration of all.

Act. Flt. Lt. J. M. BOURASSA, D.F.C., R.C.A.F., No. 635 Sqn.—Since the award of the D.F.C. this officer has completed many further sorties as captain of aircraft with outstanding success. He has always displayed the utmost determination to complete his missions which, combined with his cool courage in the face of all opposition and his unfailing devotion to duty, have won the confidence and admiration of all members of his crew.

Act. Flt. Lt. P. C. CADEGAN, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—Flt. Lt. Cadegan has now completed two successful tours of operations during which he has participated in attacks against such heavily defended targets as Berlin, Dusseldorf and Stuttgart. He has proved himself a fearless leader and skilful pilot. On many occasions he has pressed home his attacks at low level in order to ensure the success of his mission. His fine fighting spirit, courage and devotion to duty have played a large part in the many successes achieved by his crew.

Act. Flt. Lt. J. R. COFFEY, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—Flt. Lt. Coffey has proved himself an exceptionally keen and skilful pilot and captain of aircraft. He has now completed two tours of operations against such strongly defended targets as Berlin, Stuttgart and Essen. Since the award of the D.F.C. he has continued to display outstanding airmanship, determination and extreme devotion to duty which have won the confidence and admiration of all his crew.

Act. Flt. Lt. R. G. HERBERT, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—Throughout two tours of operational duty Flt. Lt. Herbert has proved himself to be a skilful and successful pilot and captain of aircraft. The targets attacked include such heavily defended areas as Berlin, Stuttgart and Stettin. His aircraft has been in combat on many occasions. Despite serious damage sustained during two of these combats he has displayed superb airmanship in flying back to base. His coolness, courage and devotion to duty, even under the most hazardous circumstances, have been most commendable.

SERVICE AVIATION

Wing Cdr. Maurice Armstrong Smith, R.A.F.V.R., who has been awarded the D.F.C. The official citation reads:—

"This officer has participated in very many sorties against a wide range of enemy targets. In November, 1944, he took part in an attack on the Dortmund-Ems Canal which resulted in the waterway being breached. Some days later Wing Cdr. Smith participated in an attack on the Mittleland Canal at Gravenhorst. During the operation his aircraft was illuminated by the searchlights and much anti-aircraft fire was directed at his aircraft. Despite this, he executed his task successfully. This officer has, by his skill, perseverance and resource, contributed much toward the success of many sorties."

In peacetime Wing Cdr. Smith, who is the elder son of the Managing Editor, served on the editorial staff of both *Flight* and *Aircraft Production*.

Act. Flt. Lt. R. C. MCCLELLAND, D.F.C., R.C.A.F., No. 109 Sqn.—This officer has completed a second tour of operations. Since the award of the D.F.C. he has participated in many operational sorties against some of the most heavily defended targets in Germany and enemy-occupied territory. He has at all times shown himself to be an exceptionally skilful navigator and has always set a high example of courage, determination and devotion to duty which has been most commendable.

Act. Flt. Lt. J. W. PATTERSON, D.F.C., R.C.A.F., No. 109 Sqn.—This officer has shown himself to be a skilful and determined navigator. His keenness to operate against the enemy combined with his consistent courage and devotion to duty has set a fine example to all. He has completed his second tour of operations and, since the award of the D.F.C. he has participated in numerous sorties against some of the most well-defended targets in Germany.

Act. Flt. Lt. P. J. WILSON, D.F.C., R.C.A.F., No. 156 Sqn.—This officer has now completed his second tour of operations. Throughout all his numerous missions he has displayed the utmost determination to press home his attacks regardless of all enemy opposition. Since the award of the D.F.C. he has completed a large number of operational sorties and has always set a praiseworthy example of leadership, courage and devotion to duty.

Flt. Lt. A. C. BAXTER, D.F.C., R.N.Z.A.F., No. 75 (N.Z.) Sqn.—Flt. Lt. Baxter has proved himself to be an outstanding pilot and captain of aircraft. At all times he has been keen to fly, despite all hazards. His great courage and unfailing devotion to duty have set an inspiring example to all squadron personnel. He has nearly completed his third tour of operations and has flown both as pilot and navigator.

Flt. Lt. D. H. TUDHOPE, D.F.C., R.N.Z.A.F., No. 139 Sqn.—Since the award of the D.F.C. this officer has completed many more operational sorties against the most heavily defended targets in Germany, including a number of attacks on Berlin. Throughout, his unflagging enthusiasm and efficiency, and his exemplary courage in the face of enemy opposition have proved a high example to all.

Distinguished Flying Cross

Group Capt. A. C. EVANS-EVANS, R.A.F.
Act. Wing Cdr. W. G. DEVAS, A.F.C., R.A.F.O., No. 115 Sqn.
Act. Wing Cdr. B. W. MCMILLAN, D.S.O., A.F.C., R.A.F.O., No. 582 Sqn.
Act. Wing Cdr. R. D. PEXTON, A.F.C., R.A.F.V.R., No. 61 Sqn.
Act. Sqn. Ldr. M. B. BERNDSSON, D.F.M., R.A.F.V.R., No. 35 Sqn.
Act. Sqn. Ldr. H. McP. JOHNSTON, D.S.O., R.A.F.V.R., No. 635 Sqn.
Act. Sqn. Ldr. G. M. ROBERTSON, R.A.F.V.R., No. 51 Sqn.
Flt. Lt. J. HIGHET, D.F.M., R.A.F.V.R., No. 635 Sqn.
Flt. Lt. R. F. NEW, R.A.F., No. 158 Sqn.
Flt. Lt. W. J. J. STEVENS, D.F.M., R.A.F.V.R., No. 625 Sqn.
Act. Flt. Lt. T. D. R. CARROLL, R.A.F.V.R., No. 83 Sqn.
Act. Flt. Lt. D. J. DIXON-JACKSON, R.A.F.V.R., No. 158 Sqn.
Act. Flt. Lt. D. V. HIBBERT, D.F.M., R.A.F.V.R., No. 158 Sqn.
Act. Flt. Lt. G. V. JOHNSON, D.F.M., R.A.F.V.R., No. 105 Sqn.
Act. Flt. Lt. D. W. MCADAM, R.A.F.V.R., No. 158 Sqn.
Act. Flt. Lt. T. G. O'DWYER, R.A.F.V.R., No. 630 Sqn.
Act. Flt. Lt. G. A. RILEY, D.F.M., R.A.F.V.R., No. 109 Sqn.
Act. Flt. Lt. R. E. ROACH, R.A.F.V.R., No. 186 Sqn.
Act. Flt. Lt. G. WATKINSON, R.A.F., No. 90 Sqn.
Act. Flt. Lt. J. C. WARBURTON, R.A.F.V.R., No. 57 Sqn.
Act. Flt. Lt. D. M. WATT, R.A.F.V.R., No. 57 Sqn.
Act. Flt. Lt. G. WILDE, R.A.F.V.R., No. 199 Sqn.

PLANE PONTOON : A floating bridge installed over the Cedar River to enable Superfortresses to be transported from factory to airfield.

SERVICE AVIATION

F/O. F. G. ABEL, R.A.F.V.R., No. 207 Sqn.
F/O G. S. BATCHELOR, A.F.C., R.A.F.V.R., No. 128 Sqn.
F/O. P. J. BRAY, R.A.F.V.R., No. 186 Sqn.
F/O. C. F. CARTER, R.A.F., No. 427 (R.C.A.F.) Sqn.
F/O. A. B. FULBROOK, R.A.F.V.R., No. 625 Sqn.
F/O. W. H. GOODRIDGE, D.F.M., R.A.F., No. 75 (N.Z.) Sqn.
F/O. D. GREIG, R.A.F.V.R., No. 186 Sqn.
Act. Flt. Lt. P. J. GOFFEY, D.F.M., R.A.A.F., No. 460 (R.A.A.F.) Sqn.
Act. Flt. Lt. A. G. CUTTRISS, R.A.A.F., No. 462 (R.A.A.F.) Sqn.
Act. Flt. Lt. A. J. HENRY, R.A.A.F., No. 103 Sqn.
Act. Flt. Lt. H. S. RATCLIFFE, R.A.A.F., No. 640 Sqn.
Act. Flt. Lt. S. W. STEWART, R.A.A.F., No. 15 Sqn.
Act. Flt. Lt. A. C. WEBB, R.A.A.F., No. 640 Sqn.
Act. Flt. Lt. W. H. WESTPNAL, R.A.A.F., No. 83 Sqn.
F/O. K. P. BRADY, R.A.A.F., No 463 (R.A.A.F.) Sqn.
F/O. H. R. HAGSTROM, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
Flt. Lt. J. A. ANDERSON, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
Act. Flt. Lt. J. A. C. BOUBASSA, No. 425 (R.C.A.F.) Sqn.
Act. Flt. Lt. D. MCCABE, D.F.M., R.C.A.F., No. 105 Sqn.
F/O. M. R. BLAKE, R.C.A.F., No. 166 Sqn.
F/O. E. F. FITZSIMMONS, R.C.A.F. No. 626 Sqn.
F/O. C. S. V HAMILTON, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
F/O. J. C. HARTY, R.C.A.F., No. 405 (R.C.A.F.) Sqn
F/O. K. M. COTTER, R.N.Z.A.F., No. 23 Sqn.
F/O. R. C. HAWKES, R.C.A.F., No. 626 Sqn.
F/O. K. H. NEWTON, R.A.A.F., No. 625 Sqn.
F/O. J. O'CONNOR, R.A.A.F., No. 576 Sqn.
F/O. G. O. PATON, R.A.A.F., No. 582 Sqn.
Act. Sqn. Ldr. J. R. CHISLETT, R.C.A.F., No. 156 Sqn.
Act. Sqn. Ldr. J. E. G. ST. JEAN, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
Flt. Lt. W. M. H. ENGLISH, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Flt. Lt. O. C. GORMAN, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
Flt. Lt. J. MacD. MORRICE, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
Flt. Lt. S. M. SEAMAN, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
Flt. Lt. M. C. SMITH, R.C.A.F., No. 514 Sqn.
Flt. Lt. J. D. TRICK, R.C.A.F., No. 514 Sqn.
Flt. Lt. W. L. E. WALKER, R.C.A.F., No. 77 Sqn.
Act. Flt. Lt. J. A. BROWN, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
Act. Flt. Lt. W. V. DUMAS, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
Act. Flt. Lt. W. G. DUNN, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
Act. Flt. Lt. L. W. FARRIS, R.C.A.F., No. 155 Sqn.
Act. Flt. Lt. A. E. GILBERT, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
Act. Flt. Lt. G. L. HERON, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Act. Flt. Lt. J. H. HOWES, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
Act. Flt. Lt. S. HUSTON, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
Act. Flt. Lt. T. D. NICHOLL-CARNE, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
Act. Flt. Lt. E. Y. O'NEILL, R.C.A.F., No. 619 Sqn.
Act. Flt. Lt. L. W. OTTEWELL, R.C.A.F., No. 57 Sqn.
Act. Flt. Lt. C. A. PROSSER, R.C.A.F., No. 35 Sqn.
Act. Flt. Lt. L. W. STEWART, R.C.A.F., No. 582 Sqn
Act. Flt. Lt. G. A. T. WILLIAMS, R.C.A.F., No. 35 Sqn.
F/O. G. I. ALLAN, R.C.A.F., No. 692 Sqn.
F/O. G. A. AUBREY, R.C.A.F., No. 415 Sqn.
F/O. J. D. BARBER, R.C.A.F., No. 101 Sqn.
F/O. F. W. BEAIRSTO, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
F/O. M. W. BENTSON, R.C.A.F., No. 78 Sqn.
F/O. J. W. L. F. BERNIER, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
F/O. W. R. BRENNAN, R.C.A.F., No. 166 Sqn.
F/O. F. H. BROWNELL, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
F/O. G. D. BUTLER, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
F/O. A. M. CAINE, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
F/O. W. A. CHARLEY, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. G. G. D'ALVISE, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
F/O. C. DANBY, R.C.A.F., No. 76 Sqn.
F/O. C. E. EMOND, R.C.A.F., No. 76 Sqn.
F/O. A. H. FALLIS, R.C.A.F., No. 514 Sqn.
F/O. F. H. FISH, R.C.A.F., No. 166 Sqn.
F/O. J. E. FISHER, R.C.A.F., No. 408 (R.C.A.F.) Sqn
F/O. A. B. FLECK, R.C.A.F., No. 619 Sqn.
F/O. J. FRIESEN, R.C.A.F.
F/O. G. R. FROST, R.C.A.F., No. 424 (R.C.A.F.) Sqn.

The badge of No. 161 Squadron, R.A.F.— "Liberate."

F/O. J. R. GALBRAITH, R.C.A.F., No. 12 Sqn.
F/O. F. M. GARRETT, R.C.A.F., No. 158 Sqn.
F/O. G. E. GEEVES, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. R. J. GAUVREAU, R.C.A.F.
F/O. J. E. J. GILBERT, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
F/O. G. C. GILLESPIE, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
F/O. D. J. GILLIS, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
F/O. B. C. GILMOUR, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
F/O. R. E. GOATCHER, R.C.A.F., No 420 (R.C.A.F.) Sqn.
F/O. D. M. GOUELEY, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
F/O. R. B. GREGG, R.C.A.F., No. 12 Sqn.
F/O. H. R. HEPBURN, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
F/O. G. W. HINMAN, R.C.A.F., No. 78 Sqn.
F/O J. V. HISLOP, R.C.A.F., No. 15 Sqn.
F/O. D. B. HOPKINS, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
F/O. H. S. HUNT, R.C.A.F., No 427 (R.C.A.F.) Sqn.
F/O. E. C. W. JOHNSTON, R.C.A.F., No. 7 Sqn.
F/O. L. H. KEELAN, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
F/O. J. KORESKY, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
Flt. Lt. R. J. MOMO, R.N.Z.A.F., No. 692 Sqn.
Flt. Lt. M. J. MOREL, R.N.Z.A.F., No. 7 Sqn.
Act. Flt. Lt. S. F. JACKSON, R.N.Z.A.F., No. 635 Sqn.
Act. Flt. Lt. E. C. MAWSON, R.N.Z.A.F., No. 635 Sqn.
Act. Flt. Lt. O. P. F. TAYLOR, R.N.Z.A.F., No. 97 Sqn.
F/O. R. E. FORBES, R.N.Z.A.F., No. 214 Sqn.
Flt. Lt. G. P. MULLAN, R.A.F.V.R., No. 428 Sqn. (since deceased)
Flt. Lt. R. S. A NEAT, R.A.F.V.R., No. 76 Sqn.
Flt. Lt. P. E NORRIS, R.A.F.V.R., No. 625 Sqn.
Flt. Lt. P. T. O'BRIEN, R.A.F.V.R., No. 76 Sqn.
Flt Lt. J. G. J. PARSONS, R.A.F.V.R., No. 78 Sqn.
Flt Lt. N. L ROSE, R.A.F.V.R., No. 550 Sqn.
Flt. Lt. J. A. RUSK, R.A.F.V.R., No. 105 Sqn.
Flt. Lt. L. W. RUTTER, R.A.F.V.R., No. 7 Sqn.
Flt. Lt I. THOMAS, R.A.F.V.R., No. 192 Sqn.
Flt. Lt. B. TIERNEY, R.A.F.V.R., No. 105 Sqn.
Flt. Lt. W J WARN, R.A.F.V.R., No. 76 Sqn.
Flt. Lt. C. WATKINS, R.A.F.V.R., No. 7 Sqn.
Flt. Lt. F. A WATT, R.A.F.V.R., No. 12 Sqn.
Flt. Lt.. P. J WHEELER, R.A.F.V.R., No. 105 Sqn.
Flt. Lt. J A S. WOOD, R.A.F.V.R., No. 76 Sqn
Act Flt. Lt S. A. ANNING, R.A.F.V.R., No. 44 Sqn.
Act. Flt. Lt. I. W. BAGSHAW, R.A.F.V.R., No. 582 Sqn.

Act. Flt. Lt. C. F. BOND, R.A.F.V.R., No. 109 Sqn.
Act. Flt. Lt. C. A. CLARKESON, R.A.F., No. 7 Sqn.
Act. Flt. Lt. S. A. CLINK, R.A.F.V.R., No. 90 Sqn.
Act. Flt. Lt. C. A. COLDRICK, R.A.F.V.R., No. 51 Sqn.
Act. Flt. Lt. J. C. DOUGLAS, R.A.F., No. 109 Sqn.
Act. Flt. Lt. C. W. G. DOWSE, R.A.F.V.R., No. 7 Sqn.
Act. Flt. Lt. C. W EATON, R.A.F.V.R., No. 97 Sqn.
Act. Flt. Lt. R. V. ECCLESTONE, R.A.F.V.R., No. 218 Sqn.
Act. Flt. Lt. D. FALGATE, R.A.F.V.R., No. 50 Sqn.
Act. Flt. Lt. C. H. FRANCIS, R.A.F., No. 90 Sqn
Act. Flt Lt. W. HANCOCK, R.A.F.V.R., No. 199 Sqn.
Act. Flt. Lt. R. J. HARRIS, R.A.F.V.R., No. 9 Sqn.
Act. Flt. Lt. R. W. M. HEATH, R.A.F.V.R., No. 44 Sqn.
Act. Flt. Lt. J. HOWARD, R.A.F.V.R., No. 78 Sqn.
Act. Flt. Lt. J. A. LAWSON, R.A.F.V.R., No. 214 Sqn.
Act. Flt Lt. G. A. MARSDEN, R.A.F.V.R., No. 35 Sqn.
Act. Flt. Lt P. P. MCGUINNESS, R.A.F.V.R., No. 35 Sqn.
Act. Flt. Lt. P. F. O'LEARY, R.A.F.V.R., No. 223 Sqn.
Act. Flt. Lt. S. J. PALMER, R.A.F.V.R., No. 12 Sqn
Act. Flt. Lt. C. G. PEAK, R.A.F.V.R., No. 35 Sqn
Act. Flt. Lt. B. R. PENGILLEY, R.A.F.V.R., No 582 Sqn.
Act. Flt. Lt. T. H. C. PHELPS, R.A.F.V.R., No. 7 Sqn.
Act. Flt. Lt. R. W. POWELL, R.A.F.V.R., No. 109 Sqn
Act. Flt. Lt. D. O. PRICHARD, R.A.F.V.R., No 78 Sqn.
Act. Flt. Lt. E. PROTHEROE, R.A.F., No. 7 Sqn.
Act. Flt. Lt. H. F. PULLEN, R.A.F., No. 102 Sqn.
Act. Flt. Lt. K. W. ROWELL, R.A.F.V.R., No. 9 Sqn.
Act. Flt. Lt. T. RUSSELL, R.A.F.V.R., No. 49 Sqn.
Act. Flt. Lt. D. A. SHAW, R.A.F.V.R., No. 550 Sqn.
Act. Flt. Lt. H. G. STEVENSON, R.A.F.V.R., No. 582 Sqn.
Act. Flt. Lt. H. TAYLOR, R.A.F.V.R., No. 102 Sqn.
Act. Flt. Lt. D. TIDY, R.A.F.V.R., No. 105 Sqn.
Act. Flt. Lt. G. M. WILLAN, R.A.F.V.R., No. 158 Sqn.
F/O. A. G. S. ALVIS, R.A.F.V.R., No. 166 Sqn.
F/O J. R. ARTHUR, R.A.F.V.R., No. 101 Sqn.
F/O R. C BAILEY, R.A.F.V.R., No. 576 Sqn.
F/O. J. B. BELL, R.A.F.V.R., No. 576 Sqn.
F/O. T. W. BIGLEY, R.A.F.V.R., No. 10 Sqn.
F/O. W. J. BUIMAN, R.A.F.V.R., No. 625 Sqn.
F/O. J. E. CARSON, R.A.F.V.R., No. 78 Sqn.
F/O. A. B CHAPPELL, R.A.F.V.R., No. 214 Sqn.
F/O. S. G. COADE, R.A.F.V.R., No. 149 Sqn.
F/O. J. M. COMPTON, R.A.F.V.R., No. 158 Sqn.
F/O. R. W. CRAFT, R.A.F.V.R., No. 640 Sqn.
F/O. E. C. CREANEY, R.A.F.V.R., No. 102 Sqn.
F/O. P. A. CURD, R.A.F.V.R., No 207 Sqn.

Distinguished Flying Medal

Flt. Sgt. W. H. J. ADAMS, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. A. E. BARFORD, R.A.F.V.R., No. 15 Sqn.
Flt. Sgt. D. J. BAVERSTOCK, R.A.F.V.R., No. 166 Sqn.
Flt. Sgt. C. I. BAXTER, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. R. B. BENTON, R.A.F.V.R., No. 635 Sqn.
Flt. Sgt. J. BLAKELEY, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. R J. S. BRUCE, R.A.F., No. 156 Sqn.

R.A.A.F. ROCKETS : Sqn. Ldr. Lavery instructs members of his squadron on the use of the rocket projectile, now being employed effectively against the Japs by the R.A.A.F.

BLIGHTY LEAVE : British troops walk towards the Transport Command Dakotas in which they are to fly back to England.

Flt. Sgt. R. BURNS, R.A.F.V.R., No. 97 Sqn.
Flt. Sgt. R. CHAPMAN, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt. C. M. CHAPPS, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. (now P/O.) J. F. COLDICOTT, R.A.F.V.R., No. 102 Sqn.
Flt. Sgt. W. W. COLLAR, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. J. COOK, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. L. M. DEY, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. A. J. DOSWELL, R.A.F.V.R., No. 582 Sqn.
Flt. Sgt. T. E. DREW, R.A.F.V.R., No. 156 Sqn.
Flt. Sgt. J. H. EGAN, R.A.F.V.R., No. 635 Sqn.
Flt. Sgt. L. EMMETT, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. A. B. FOSTER, R.A.F.V.R., No. 514 Sqn.
Flt. Sgt. S. GIBSON, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. K. P. B. GRANTHAM, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt F. J. HARPER, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. G. F. J. HEARD, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. W. C. HERRICK, R.A.F.V.R., No. 635 Sqn.
Flt. Sgt. F. HOLL, R.A.F., No. 582 Sqn.
Flt. Sgt. F. JONES, R.A.F.V.R., No. 158 Sqn.
Flt. Sgt. R. C. C. JONES, R.A.F., No. 156 Sqn.
Flt. Sgt. G. T. KING, R.A.F.V.R., No. 635 Sqn.
Flt. Sgt. D. KITTO, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.
Flt. Sgt. A. LIMOND, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. N. MOFFATT, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt. K. C. MOYE, R.A.F.V.R., No. 582 Sqn.
Flt. Sgt. J. A. COWAN, R.C.A.F., No. 12 Sqn.
Flt. Sgt. (now P/O.) L. V. P. MCLEOD, R.C.A.F., No. 12 Sqn.
Flt. Sgt. T. A. BIRCH, R.A.F.V.R., No. 514 Sqn.
Flt. Sgt. R. K. GANT, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
Flt. Sgt. J. V. GOFF, R.A.F.V.R., No. 158 Sqn.
Flt. Sgt. D. G. HIRD, R.A.F.V.R., No. 49 Sqn.
Flt. Sgt. D. E. LACEY, R.A.F.V.R., No. 97 Sqn.
Flt. Sgt. W. D. NOALL, R.A.F.V.R., No. 97 Sqn.
Flt. Sgt. J. O'BRIEN, R.A.F.V.R., No. 10 Sqn.
Flt. Sgt. A. W. M. CASSIDY, R.A.A.F., No. 514 Sqn.
Flt. Sgt. J. R. GIBSON, R.A.A.F., No. 462 (R.A.A.F.) Sqn.
Flt. Sgt. C. A. BARBER, R.C.A.F., No. 434 (R.C.A.F.) Sqn.

Roll of Honour

Casualty Communiqué No. 482.

THE AIR MINISTRY regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 152 are second entries giving later information of casualtjes published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. D. W. Ayers; Flt. Sgt. J. P. Baker; Sgt. R. H. Barnes; F/O. G. Borkett; F/O. G. W. Davies; Sgt. H. Day; Sgt. A. Harris; Sgt. J. M. Mackenzie; F/O. L. W. Perry; F/O. L. W. Perry; F/O. A. F. Sheffield; F/O. J. A. Smith; Sgt. J. Walaron; Sgt. B. W. Weston.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. F. L. Bones; Sgt. C. V. Clarke; Flt. Sgt. J. C. Dalzell; Sgt. E. H. Davies; P/O. W. G. Davies; Sqn. Ldr. K. G. Davis; Sgt M. F. Godfrey; Flt. Sgt. R. P. Hayles; Flt. Sgt. G. Hobby; F/O. E. R. F. Leggett; Sgt. N. H. Lerigo; Flt. Sgt. F. Lloyd; F/O. K. Marriott, D.F.M.; Sgt. J. Mowbray; Sgt. E. F. Pates; Flt. Sgt. R. G. Phillipps; Sgt. W. Rees; Sgt. O. S. Roberts; Sgt. A. E. J. Sleven; Sgt. J. L. P. Taylor; F/O. K. J. Tubbs; Act. Flt. Sgt. R. Yates.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. Abrahams; F/O. T. J. Adamson, D.F.M.; Flt. Lt. S. H. Alcock; Sgt. K. Aspinall; Sgt. L. H. Barnes; Sgt. R. W. Beresford; Sgt. E. W. Bolt; Sgt. H. E. Bryce-Jeffery; Sgt. G. J. Bucknall; Sgt. S. Bullamore; P/O. I. G. Bunn; Flt. Sgt. R. Butler; F/O. D. H. Calman; Flt. Sgt. R. W. Carver; Sgt. R. J. Chaplin; P/O. J. A. Cockin; Sgt. C. Coe; Flt. Lt. F. G. T. Collins; Flt. Sgt. C. S. Cook; Sgt. N. P. Cook; Sgt. L. A. Crooks; Sgt. J. Davies; Act. Flt. Lt. L. G. Davis; Flt. Sgt. T. Dawson; F/O. A. J. Easey; Flt. Sgt. D. Entwistle; Sgt. H. Feeney; Sgt. J. A. Filby; F/O. B. Findley; Flt. Sgt. B. R. Finney; Sgt. F. M. Forde; Flt. Sgt. R. Fowler; Sgt. W. B. Gilchrist; Sgt. K. E. Green; Sgt. G. Griffiths; Sgt. H. Hemmings; Sgt. J. Hill; P/O. H. S. Hodgson; Sgt. J. T. Hollow; Flt. Sgt. L. A. Horton; F/O. J. Howarth, D.F.M.; Sgt. D. J. Howell; Sgt. K. Hunt; Sgt. S. J. L. Jones; Sgt. J. S. Kennedy; Sgt. C. R. King; P/O. J. Lanaghan; Sgt. R. H. Lloyd; Sgt. W. H. McMillan; Sgt. A. H. Masters; Sgt. S. J. Meeham; Flt. Sgt. F. H. Mosen; Sgt. T. Nelson; Act. W/O. D. J. Nixon; Sgt. G. North; Sgt. J. C. W. Olliffe; W/O. V. G. Osterloh; Sgt. J. O'Sullivan; P/O. G. Owen; Flt. Sgt. N. E. Plaxton, D.F.M.; Sgt. P. E. Pont; F/O. J. A. Price; Flt. Sgt. K. Prouten; Flt. Lt. E. W. Sargent, D.F.C.; F/O. R. J. Scott; Sgt. A. E. Sly; P/O. T. H. Smith; Sgt. R. Stuart; Act. Flt. Lt. W. A. L. Swan; Sgt. R. Tugman; Sgt. W. Wakefield; Sgt. H. S. Waller; Sgt. W. J. Webb; Sgt. P. I. Weeks; P/O. H. R. W. Whittle; Sgt. P. R. Wynde; Flt. Sgt. P. R. Zanchi.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. K. R. Rogers; Flt. Sgt. J. E. Trewick.

MISSING.—Flt. Sgt. S. C. Alldis; F/O. H. C. Annett; Sgt. R. L. Armstrong; Flt. Sgt. F. Ashworth; Sgt. J. Baggaley; Sgt. C. Bayford; Flt. Sgt. C. E. Bayliss; Sgt. A. K. Beach; Flt. Sgt. E. A. Borley; Act. F/O. S. Bowden; Sgt. A. C. Brett; Flt. Sgt. C. Brignell; Sgt. D. W. Brittan; L.A/C. R. S. Bury; Sgt. W. Clyde; F/O. W. J. Cowen; W/O. J. M. Crawford; Flt. Sgt. G. W. Crawley; Sgt. J. A. Crisp; Sgt. J. MacG. Croll; Flt. Sgt. L. Croney; Sgt. W. Darby; P/O. R. J. Deeble; Sgt. R. R. Dickinson; Flt. Lt. J. L. Ellis; Flt. Sgt. J. England; F/O. H. E. Evans; Flt. Sgt. J. McF. Farrell; Sgt. W. Forster; Flt. Sgt. T. R. Frayne; Flt. Sgt. S. C. Green; Flt. Sgt. W. Hardy; W/O. G. S. Harman; Flt. Sgt. R. T. Harrison; P/O. W. B. Hellon; Flt. Sgt. S. N. Hilder; Flt. Lt. P. M. Mill; Sgt. D. A. Holmes; P/O. J. Holton; Act. F/O. E. W. Hookings; Sgt. W. Irvine; P/O. D. T. W. Jones; W/O. W. King; P/O. J. Lane; Sgt. W. M. McIntyre; Sqn. Ldr. E. W. McKeeman; Sgt. J. A. McLaughlin; W/O. J. G. Madge; W/O. H. Mallinson; W/O. H. J. Moore; F/O. T. G. Morriss; Act. F/O. C. D. Neale; Sgt. R. H. G. Nevard; Sgt. A. C. Norris; L.A/C. F. Norris; Sgt. L. A. Oldfield; A/C.2 G. R. Parkes; L.A/C. D. Raymer; F/O. B. Redfern; Flt. Sgt. G. W. Roach; Flt. Lt. N. Robison; A/C.2 J. A. Rodger; F/O. S. Rodgers; L.A/C. R. B. G. Rowley; Flt. Lt. J. S. Runnacles; Flt. Sgt. J. Ryan; Sgt. G. Saville; W/O. K. R. Saywell; L.A/C. L. Scanlon; L.A/C. F. Selway; L.A/C. H. Sinton; L.A/C. B. Skillings; L.A/C. W. H. Skinner; L.A/C. W. J. Slater; Sgt. F. J. Sloane; Flt. Lt. D. J. Sutcliffe; Flt. Sgt. J. E. Talbot; Flt. Sgt. K. Tonks; F/O. G. L. Towns; Sgt. C. D. Vaughan; Sgt. R. G. Walters; Sgt. E. F. Wood; W/O. F. Woolmington.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. C. R. Hughes.

KILLED ON ACTIVE SERVICE.—Flt. Lt. G. J. Binks; Act. Flt. Lt. E. F. Cleary; F/O. H. D. E. Ebbs; Act. Flt. Lt. S. Greenop; F/O. L. E. Gregory; L.A/C. P. J. E. Phipps; L.A/C. F. W. Robinson; L.A/C. A. J. Rudderham; P/O. A. Salmon; A/C.1 R. Shingler; L.A/C. A. J. Smith; L.A/C. G. E. Sparkes; P/O. J. R. F. Teague; Cpl. G. Telford; Act. Flt. Lt. L. J. Tyler; A/C.2 V. J. Wapples; Flt. Sgt. C. J. Watchorn; Wing Cdr. W. E. Wendon; P/O. W. J. Whawell.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. W. H. Davies; P/O. T. Proctor; Sgt. G. F. Simpkin; Sgt. O. H. Thomas; Flt. Sgt. S. G. Thomas; Flt. Sgt. F. R. Tuxill.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. R. H. Dickman; Flt. Sgt. P. D. Dowling; Sgt. R. B. Jowett; L.A/C. J. G. Morris; L.A/C. J. McD. Paterson; A/C.2 J. W. A. Webster.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTIVE SERVICE.—L.A/C. W. Leonard; F/O W. Morrice.

PREVIOUSLY REPORTED WOUNDED OR INJURED ON ACTIVE SERVICE, NOW REPORTED DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. W. T. Burton.

DIED ON ACTIVE SERVICE.—L.A/C. L. Benson; Act. Cpl. T. F. Hanrahan; Cpl. T. P. Millar; Sgt. C. Privett; Sgt. F. Thornley.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. K. O. Barnes; Flt. Sgt. J. J. Smith.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. R. N. Allan; Flt. Sgt. G. C. Brasington; Flt. Sgt. A. J. J. Brown; P/O. A. G. J. Chadwick-Bates; F/O. W. H. Hewson; F/O. R. M. Jacombs; W/O. L. A. Kent; Flt. Sgt. C. C. Liersch; Flt. Sgt C. H. Martin; Flt. Sgt. C. W. Reed; P/O. E. G. Thomas; P/O. J. H. Thomson; P/O. J. H. Thomson; Flt. Sgt. M. R. Trout; Sqn. Ldr. E. A. G. Utz, D.F.C.; P/O. C. W. Walker.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—Act. Flt. Lt. C. C. Kissner.

MISSING.—F/O. J. Austin; F/O. P. J. Bowell; Flt. Sgt. B. H. Brown; Flt. Sgt. W. H. J. Butcher; F/O. J. A. G. Cooper; F/O.. L. Draysey; Flt. Sgt. I. D. Dutfield; F/O. H. V. Ellens; Flt. Sgt. B. Hesford; Flt. Sgt. W. V. Johnstone; W/O. E. A. Petersen; W/O. W. Plumb; Flt. Sgt. R. B. Templeton; W/O. J. R. Williams.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. G. N. Barber.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. C. G. Gavan.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. N. T. Anderson; F/O. A. W. Edgar; F/O. D. J. Elliott.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. J. Allan; Flt. Sgt. C. A. Besse; W/O. J. T. Carter; F/O. J. G. Connor; P/O. A. S. Gates; F/O. J. E. Godwin; W/O. A. M. Goodall; Flt. Sgt. R. G. H. Gustafson; Flt. Sgt. S. M. Liddle; F/O. R. M. McCabe; W/O. R. L. McCulloch; Sgt. R. L. McManus; Sgt. H. T. Penfold; P/O. G. H. Rich; Flt. Sgt. A. D Steels; Sgt. A. J. Steinacker; Sgt D. B. Stone; F/O. T. D. Trippe; P/O. E. P. Twiname; F/O A. E. Wyton.

WOUNDED OR INJURED IN ACTION.—W/O. J. D. White.

MISSING, BELIEVED KILLED IN ACTION.—F/O. A. Bruce; P/O. W. S. Curtis; W/O. N. G. Marler; P/O. N. Novack; P/O. J. W. Savoie; Sgt. E. D. Wilmot.

MISSING.—Act. F/O. J. C. Badgley; Flt. Sgt. A. G. Best; P/O. V. A. G. Brochu; Flt. Sgt. D. F. Brown; F/O. E. J. Brown; Sgt. V. D. Campbell; Flt. Sgt. C. E. L. Cook; Flt. Sgt. M. A. Cook; W/O. D. M. Davies; Flt. Sgt. R. A. Dowling; Flt. Lt. M. J. Dugas; Sgt. G. A. Dunkelman; F/O. K. I. Durk; P/O. L. Gobel; F/O. L. L. Guthrie; F/O. J. S. Hill; F/O. E. D. Hodgson; F/O. F. A. Horning; Flt. Sgt. F. G. Hull; Flt. Sgt. J. H. Kelly; Flt. Sgt. T. J. McAran; Flt. Sgt. T. G. McLeod; P/O. R. W. D. Murphy; F/O. R. E. Rennie; Flt. Sgt. R. C. Robinson; F/O. E. J. Russelstrom; Flt. Sgt. N. E. Stuttle; F/O. G. J. Symes; F/O. G. T. G. Terris; Sgt. W. A. Woods.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—F/O. N. C. Dumont; Flt. Sgt. R. C. Orrock; Sgt. E. J. Post.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. W. W. E. Anderson; F/O. J. R. Morin.

The badge of R.A.F. Station Drem—"Exiit Hinc Lumen" ("From Here Went Forth the Light").

SERVICE AVIATION

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. C. Hamilton; Flt. Sgt. A. H. Hayward; F/O. R. A. Peters, D.F.M.

MISSING.—W/O. R. W. Beck; Flt. Lt. P. Langston; W/O. A. J. Phillips; W/O. H. Smolenski.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. J. A. Sanderson.

South African Air Force

MISSING.—Lt. R. R. Lissley.

Casualty Communiqué No. 483.

Of the names in this list, 150 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Act. F/O. F. W. Dainty; Flt. Sgt. J. D. Friend; Sgt. A. H. J. Goddard; Act. Sqn. Ldr. J. R. Heap, D.F.C.; W/O. E. M. Larsen; F/O. G. H. Myers; Flt. Sgt. W. F. Waters; Flt. Sgt. W. Westwell.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. D. J. Brewer; Flt. Sgt. A. A. Pardoe; Flt. Sgt. K. Sims; F/O. H. Wallis.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. H. R. Adams; Sgt. J. A. Adams; P/O. P. H. Axton; Sgt. N. N. Bligh; Sgt. M. Bools; P/O. E. G. Bradley; Sgt. J. Briggs; P/O. W. Buckel; Sgt. R. H. Bussell; Sgt. W. H. Carter; Sgt. A. V. Collins, D.F.M.; Sgt. D. C. Cornes; F/O. R. R. T. Crump; Sgt. E. W. Davies; P/O. R. Dunlop; F/O. E. J. Edwards; Flt. Sgt. J. A. Fowler; Sgt. F. A. Fuller; Sgt. P. C. Hagger; Sgt. J. Harris; Flt. Sgt. R. O. Hiscock; Sgt. D. H. Hughes; Sgt. H. A. R. Hurn; Sgt. J. Hurst; Act. W/O. J. K. Ives; Sgt. A. L. Jackson; Sgt. L. James; Sgt. J. Judd; F/O. J. Kellett; Sgt. S. Lewis; Sgt. H. R. Lintern; Sgt. H. Longworth; Sgt. J. McNaughton; P/O. J. Marsden; Flt. Sgt. A. Mayes; Sgt. W. R. Mead; Sgt. R. R. Minchin; Sgt. A. S. O'Connor; Sgt. W. M. Phillips; Flt. Lt. R. C. Pickering; F/O. A. W. Read; F/O. C. G. Richards; Flt. Sgt. J. T. Richards; Sgt. W. E. Ridge; P/O. W. A. Robertson; Sgt. F. E. Ryder; Sgt. D. P. J. Savage; Sgt. A. J. W. Saxty; Sgt. J. E. Searle; Sgt. D. Sissons; P/O. A. F. Smith; Sgt. A. E. Smith; P/O. G. Smith; Sgt. H. Smith; Act. Flt. Lt. V. Smith, D.F.C.; F/O. H. G. Stuffin; Flt. Sgt. D. A. A. Swain; Flt. Sgt. A. Thompson; Sgt. R. Thorn; Sgt. D. W. Timms; Sgt. C. C. Toms; P/O. S. J. Troake; Sgt. B. F. Tutt; Flt. Sgt. R. G. Vincent; Sgt. W. J. Ward; P/O. T. Watson; Flt. Sgt. J. Watters; Sgt. H. W. Whitfield; Sgt. A. Wilson.

WOUNDED OR INJURED IN ACTION.—F/O. Ekers; F/O. Loewenthal; Sgt. V. Oates; Sgt. J. T. Powell; Sgt. R. E. Skinner.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. E. Roberts.

MISSING, BELIEVED KILLED IN ACTION.—P/O. L. Berry; Flt. Sgt. A. B. Cantle; Flt. Sgt. E. C. Gunning; Sgt. N. Williams.

MISSING.—A/C. J. Baker; P/O. J. R. Baxter; Flt. Sgt. G. W. Bell; Flt. Sgt. L. W. Bennett; Flt. Lt. W. A. S. Blackden; P/O. K. H. Bonner; Sgt. S. G. Bradley; Flt. Sgt. G. J. Burns; Flt. Sgt. P. W. Burr; Sgt. R. Charlton; F/O. P. C. Clapham; P/O. G. G. Clark; Sgt. P. Connell; Flt. Lt. T. N. Cooper; Flt. Sgt. D. J. Cornish; Flt. Sgt. B. F. F. Crimes; Sgt. J. Dalley; P/O. W. C. Davidson; L.A/C. B. Davies; Sgt. K. V. Dean; Flt. Sgt. A. Diack; Flt. Sgt. J. E. Elley; L.A/C. E. D. English; Sgt. E. Evans; P/O. D. P. Feeny; P/O. D. I. B. Fisher; Cpl. G. H. Folkard; Act. Flt. Lt. F. J. Ford; W/O. M. G. George; Sgt. R. Glover; Flt. Sgt. R. I. Gray; F/O. A. L. Greenwood; Flt. Sgt. H. Hall; Sgt. S. Harding; F/O. J. H. G. Harland; P/O. L. Harris; Sgt. J. A. Haywood; Act. F/O. T. D. Hooper; Act. Flt. Lt. E. Howell; Sgt. D. J. D. Huggett; Sgt. G. W. Hurst; Flt. Sgt. R. D. Jerrard; Cpl. M. Kaminsky; L.A/C. A. J. Kendall; Sgt. A. Lackey; Sgt. J. Leonard; Sgt. K. J. Liggins; Sgt. S. D. Lucas; Sgt. D. McCarthy; F/O. I. R. MacAulay; P/O. C. H. McConaghy; Sgt. B. McGarrity; Cpl. T. N. Mark; Sgt. L. S. Martin; Sgt. P. C. Martin; Sgt. J. C. Moore; Flt. Sgt. H. G. Newbery; Sgt. G. Nixon; F/O. M. W. Oliver; Sgt. J. Orford; Sgt. R. McK. Paterson; Sgt. R. Patterson; Sgt. W. E. Pike; L.A/C. G. F. Poole; Sgt. F. J. Raymen; L.A/C. S. P. Rees; Sgt. J. C. Richardson; L.A/C. L. E. Rigby; L.A/C. T. E. Ruth; L.A/C. F. Salter; Sgt. J. G. D. Sanders; Sgt. R. A. S. Scott; Sgt. J. A. Sherrit; Sgt. L. Slocombe; A/C.2 R. T. Smith; L.A/C. A. E. Spears; L.A/C. E. P. Spence; Cpl. J. R. Stirzaker; Sgt. C. H. Stockwell; Flt. Lt. F. J. Stratton; Sgt. C. Sunderland; P/O. J. R. Tanner; Sgt. G. W. Tolliday; Sgt. E. D. Wakefield; Sgt. N. D. Webster; Sgt. L. J. Weekes; Sgt. R. White; Flt. Lt. K. W. Whitefield; L.A/C. J. J. Young; A/C.1 W. G. Young.

KILLED ON ACTIVE SERVICE.—Sgt. A. E. Ackral; F/O. R. W. Alford; Flt. Lt. R. W. Clancey; L.A/C. R. S. Corbett; Sgt. A. Davies; L.A/C. R. A. Duff; P/O. A. E. T. Eglinton; Sgt. C. L. Fender; Cpl. S. Forey; Sgt. W. B. Forsyth; Sgt. D. W. H. Hall; Cpl. W. J. Harvey; F/O. W. D. Hodgson; L.A/C. A. A. Hopkins; Sgt. B. Kelly; Flt. Sgt. J. G. Lamb; W/O. W. Redding; L.A/C. E. C. Roper; Sgt. B. Saunders; Sgt. J. E. L. Sherwin; Flt. Sgt. M. Smith; Flt. Sgt. E. R. Southern; Sgt. P. Straiton; A/C.1 G. F. Tatum; Sgt. K. E. Thomson; L.A/C. H. Trew; Sgt. S. E. Witz; Sgt. R. E. H. Wood; Cpl. L. F. Woodford; Cpl. E. S. Zeller.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. W. Bailey.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. R. E. Bird; L.A/C. H. Bolton; Flt. Sgt. E. R. Buttle; L.A/C. L. E. Cole; Flt. Sgt. W. E. Craber; F/O. I. G. Hunt; Sgt. H. Marland; Cpl. W. I. Matthews; A/C.2 R. T. Myatt; Sgt. C. Oliver; L.A/C. J. B. Paston; A/C.2 A. I. Peet; L.A/C. R. M. Shillabeer; Sgt. T. J. Smith; Sgt. J. W. Stewart; L.A/C. P. A. Walker.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Sgt. F. G. Cox; L.A/C. E. Morgan; L.A/C. R. B. Stratton.

DIED ON ACTIVE SERVICE.—Flt. Lt. A. E. Challenger; L.A/C. W. F. Hamilton; Act. Sqn. Ldr. H. S. Hennah; L.A/C. P. J. Pritchard; A/C.2 L. G. Wells.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Act. Sqn. Ldr. J. H. Chase; Flt. Sgt. W. Cliff.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.1 W.' M. Evans.

Royal Australian Air Force

KILLED IN ACTION.—Act. Sqn. Ldr. R. G. Foskett, D.F.C.; Act. F/O. L. K. Landridge; Flt. Sgt. W. J. Lemin; Flt. Sgt. K. A. Mashman.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. E. Bremner.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. P. E. Hanson; Flt. Sgt. J. M. M. Wilson.

MISSING.—Flt. Sgt. W. T. Dobbie; W/O. J. G. Lawrence; F/O. C. J. Lynch; Flt. Sgt. E. A. Woolmer.

KILLED ON ACTIVE SERVICE.—Flt. Lt. C. W. Mayes; Flt. Sgt. I. O'Connor; P/O. G. V. Weeks.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. P. C. T. Armytage.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. D. D. Lloyd; W/O. S. D. Martin; F/O. D. S. Martinson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. R. M. Watson; Flt. Sgt. A. Williston.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. S. W. Abrams; Flt. Sgt. W. B. Ballantyne; Sgt. R. N. Barlow; Sgt. R. J. Baroni; Flt. Lt. G. T. Berg; F/O. D. S. Bier; Flt. Sgt. D. G. Booth; F/O. J. R. Bradley; Flt. Sgt. B. C. Cameron; Flt. Sgt. R. G. Clarkson; Act. Flt. Lt. W. B. B. Cloutier; F/O. W. G. Cockwill; Flt. Sgt. J. R. Cote; F/O. R. F. Coulson; Flt. Sgt. H. D. A. Daak; Sgt. R. Dempster; Flt. Sgt. A. E. Dimock; P/O. W. J. Douglas; Sgt. H. E. Evans; F/O. A. A. Fischer; P/O. T. D. Gavin; Flt. Sgt. A. L. P. Gibson; F/O. T. C. Gierulski; Sgt. L. K. Gilmar; W/O. C. G. Glover; W/O. A. N. Gott; Flt. Sgt. F. Guay; Sgt. M. C. Harrington; Flt. Sgt. L. J. Johnson; Flt. Sgt. F. J. Kelly; Sgt. J. G. E. Laflamme; Flt. Sgt. J. L. Lamb; P/O. G. B. Loney; Flt. Sgt. J. R. G. MacDonald; F/O. W. R. McGregor; F/O. J. B. Mahoney; W/O. W. F. Marshall; Flt. Sgt. I. A. Martin; W/O. A. R. Merritt; W/O. F. R. Moffat; Flt. Sgt. G. A. Munro; Sgt. E. J. Oakley; P/O. V. Parrott; Flt. Sgt. C. Pennycook; F/O. G. B. Pronger; Sgt. J. L. R. Rainville; F/O. G. I. Ransom; F/O. J. R. Rumbel; Flt. Lt. E. A. Sanderson; Flt. Sgt. J. E. Saunders; P/O. J. A. St. Denis; F/O. R. G. Selman; F/O. D. A. Shewan; F/O. L. E. Sibbald; Sgt. E. Smith; Flt. Sgt. D. Thornton; P/O. M. D. Tymchuk; F/O. R. D. L. Vietto; Flt. Sgt. A. M. Wilkinson; Sgt. J. I. Wilson; Sgt. Z. Yonkers.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. C. A. Barber.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. R. K. Armstrong.

MISSING, BELIEVED KILLED ACTION.—F/O. J. L. Eagleson.

MISSING.—Sgt. A. G. Balfour; Flt. Sgt. D. E. Burrows; F/O. A. D. Chapman; P/O. E. E. Courtis; F/O. F. J. Crowley; P/O. J. P. Durkin; P/O. A. L. Flatt; Flt. Sgt. D. L. Hann; Flt. Sgt. L. M. Inman; Flt. Sgt. T. A. Johnston; Flt. Lt. L. R. B. Loving, D.F.C.; F/O. N. E. H. McConnell; Flt. Sgt. A. C. McLeod; Sgt. W. E. Morrison; P/O. G. A. Running; Sgt. J. F. G. Weedon.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. L. Melville.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. A. J. Copegog; W/O. F. Middleton.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. R. W. Bradford.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. E. D. McCallum; F/O. A. G. Metcalf, D.F.M.; P/O. A. R. Stewart; P/O. I. Tyrdeich.

WOUNDED OR INJURED IN ACTION.—W/O. T. F. Annear.

MISSING.—F/O. T. G. H. Adams; F/O. I. C. Rodgerson; Flt. Lt. R. M. Singer.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—P/O. C. McInnes.

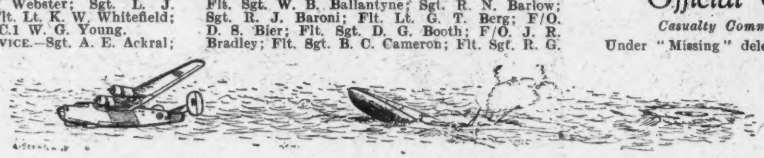
PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. H. W. A. Blackwood.

South African Air Force

MISSING.—Lt. J. Duran; 2/Lt. W. M. Thompson; Lt. J. A. Thomson.

Official Correction

Casualty Communiqué No. 481.

Under "Missing" delete F/O. A. G. DAVIES.

PICKED CLEAN : When an American aircraft crashes in N.W. Europe, a ground crew removes all important equipment. Here is a crashed Mustang, left by the ground crew with the usual notice.